

Systematics of *Mendoncia* (Acanthaceae: Thunbergioideae) in the Paleotropics

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A taxonomic revision of the Paleotropical species of the amphi-Atlantic, acanthaceous genus *Mendoncia* recognizes 10 species in Africa and Madagascar. Herbarium specimens from throughout these regions were used to formulate descriptions of species, obtain distributional and ecological data, and acquire pollen for characterization and illustration of palynological features of species in the Old World. Aspects of floral biology of *M. cowanii* in Madagascar were studied in the field. Distribution maps, illustrations and photographs showing characteristic morphological features, and both comprehensive and geographic keys for identification of species accompany the revision. Lectotypes are designated for nine names pertaining to Paleotropical *Mendoncia*.

KEYWORDS: Taxonomy, distributions, floral biology, Madagascar, Africa, endemic species

Une révision taxonomique des espèces paléotropicales du genre amphi-atlantique et acanthacées *Mendoncia* reconnaît 10 espèces en Afrique et Madagascar. Des échantillons d'herbier provenant de toutes ces régions ont été utilisés pour formuler des descriptions d'espèces, obtenir des informations sur la distribution et d'écologie, et acquérir du pollen pour la caractérisation et l'illustration des caractéristiques palynologiques des espèces dans le Vieux Monde. Des aspects de la biologie floral de *M. cowanii* en Madagascar ont été étudiés dans la nature. Des cartes de distribution, des illustrations et des photographies montrant des caractéristiques morphologiques, et des clés complètes et géographiques pour l'identification des espèces accompagnent la révision. Les lectotypes sont désignés pour neuf noms appartenant à *Mendoncia* paléotrope.

INTRODUCTION

Mendoncia Vell. ex Vand. consists of about 90 species occurring in tropical regions of both the Old World and the New World. The greatest concentration of species is in the Neotropics, where some 80 species occur in moist to wet forests from southeastern Mexico to Bolivia and Brazil. The richest region appears to be Colombia where about 35–40 species have been recorded. To date, there is no comprehensive taxonomic account for the entire genus; however, useful treatments have been provided for several regions of the New World, including: Colombia (Leonard 1951), Bolivia (Wasshausen and Wood 2004), Brazil (Profice 1989), Ecuador (Wasshausen 2013), Mexico (Daniel 1992), Panama (Durkee 1978), Costa Rica (Durkee 1986), and the Guianas (Wasshausen 2006). More recent checklists (e.g., Profice et al. (2010) for Brazil and Wood and Aymard (2015) for

Colombia) have augmented and revised some of these accounts, and added occurrence data from additional nations. Species in the Old World occur throughout tropical central Africa from Liberia east to Kenya and Tanzania, and on the Indian Ocean islands of Madagascar and Mayotte. Regional accounts include those for tropical western Africa (Hutchinson et al. 2013), tropical eastern Africa (Vollesen 2008), Gabon (Heine 1966), and Madagascar and the Comoros Archipelago (Benoist 1967). In this first systematic account of all Paleotropical *Mendoncia* 10 species are recognized, with four restricted to tropical Africa and six endemic to Madagascar and Mayotte.

Morphologically, the genus is unique among Acanthaceae by the combination of its twining habit, enlarged bracteoles subtending the flowers that form an epicalyx, highly reduced calyx, (4–) 5 (–6)-brevicolpate pollen, and drupaceous fruit that bears a single seed. This study is based on information obtained from more than 575 herbarium specimens, a literature review, field observations in Madagascar, and laboratory studies of pollen. A taxonomic revision of the Paleotropical species includes maps of geographic ranges and other ecogeographic data, illustrations and images of plants and pollen, and field observations on some aspects of floral biology for one of the Malagasy species, *M. cowanii*.

TAXONOMIC HISTORY

The genus *Mendoncia* was established by Vandelli (1788), who named it for Cardinal Mendonça, Patriarch of Lisbon. Subsequently, two species, *M. aspera* and *M. racemosa* (as “*Mendozaia*,” an orthographic variant), were described by Ruiz and Pavón (1798). These and several other species were treated by Nees (1847) in his comprehensive monograph of the family. In that account Nees also described the American genus *Engelia* Nees, which he distinguished from *Mendoncia* by having an anterior split in the limb of the corolla and a spur in the corolla tube. These characters were deemed insufficient to warrant separate generic status by Bentham (1876), who treated *Engelia* as a synonym of *Mendoncia*.

The Paleotropical species of *Mendoncia* were previously described under three generic names: *Monachochlamys* Baker, *Afromendoncia* Gilg ex Lindau, and *Lirayea* Pierre. *Monachochlamys* was described as a shrub by Baker (1883), placed in tribe Thunbergioideae, and considered to be distinct from both *Thunbergia* Retz. and *Mendoncia* by its habit and other unspecified characters. The illustration in the protologue clearly shows a twining plant. *Afromendoncia* was described as a new genus with two species from tropical western Africa (Lindau 1893) that differed from the American genus *Mendoncia* by its single ovary chamber. In his influential account of Acanthaceae, Lindau (1895) recognized *Mendoncia* from the Neotropics, *Monachochlamys* from Madagascar, and *Afromendoncia* from Africa. Subsequently, and with some trepidation, Pierre (1896) described *Lirayea* in this assemblage of genera, and distinguished it largely based on his observations of the ovules being “descending” (vs. purportedly “ascending” in the other genera). Burkill (1899) treated *Lirayea* as a synonym of *Afromendoncia*, and subsequently, Moore (1929) included *Afromendoncia* within *Monachochlamys*. Benoist (1925, 1944) included all of the species described in *Afromendoncia*, *Lirayea*, and *Monachochlamys* in *Mendoncia*, and indicated that characters used to distinguish the Paleotropical taxa from those of *Mendoncia* in the New World were insufficient.

INFRAFAMILIAL AND INFRAGENERIC AFFINITIES

The convoluted taxonomic classification of *Mendoncia* was summarized by Turrill (1919), Profice (1988), Bremekamp 1953, Schönenberger and Endress (1998), and Borg et al. (2008), who noted treatment of the genus in the acanthaceous tribes Thunbergieae (Endlicher 1839; Bentham 1876) and Mendoncieae (Meisner 1840); in subfamilies Thunbergioideae (Scotland and Vollesen

2000) and Mendoncioideae (Lindau 1895) of Acanthaceae; and in families Thunbergiaceae (Van Tieghem 1908) and Mendonciaceae (Bremekamp 1953). Classifications based on both molecular and morphological data during the past 20 years have consistently treated the genus in Acanthaceae (Schönenberger and Endress 1998; McDade and Moody 1999; McDade et al. 2000; Scotland and Vollesen 2000; Borg et al. 2008). Within that family, *Mendoncia* is monophyletic and pertains to subfamily Thunbergioideae (Scotland and Vollesen 2000; Borg et al. 2008; McDade et al. 2008), where it is sister to *Thunbergia* and *Pseudocalyx* Radlk. (Borg et al. 2008), based on sampling to date (Fig. 1).

Thunbergioideae consist of five genera, *Anomacanthus* R.D. Good, *Mendoncia*, *Meyenia* Nees, *Pseudocalyx*, and *Thunbergia*, and can be distinguished by several probable morphological synapomorphies, including: climbing habit, enlarged and postgenitally united bracteoles forming an epicalyx, and reduced calyces (Brummitt 1989; Schönenberger and Endress 1998). In their study of floral development among three of these genera, Schönenberger and Endress (1998) showed that *Thunbergia*, *Mendoncia*, and *Pseudocalyx* share similar types of inflorescences and poricidal anther thecae with unicellular/lignified bristles and without an endothelial cell layer. Also, as previously suggested by earlier studies (e.g., Van Tieghem 1908; Benoist 1944), they demonstrated that

Mendoncia initially has two ovary locules with four ovules, like many other members of the Acanthaceae, but later in development abortion results in a single locule with two fertile ovules, only one of which develops into a seed. It is noteworthy that among the five genera of Thunbergioideae, only *Mendoncia* occurs natively in the New World, where the vast majority of its species are found. Based on species of *Mendoncia* studied by Borg et al. (2008), the three Paleotropical species sampled form a grade from which the monophyletic Neotropical species are derived, two Malagasy species are sister to one another, and the sole African species sampled is sister to the Neotropical clade (Fig. 1). The five genera of Thunbergioideae can be distinguished by the following key.

Key to Genera of Thunbergioideae

- 1a. Fruit fleshy and indehiscent (drupe); ovules 2; seeds 1 or 2 2
- 1b. Fruit woody and dehiscent (capsule); ovules 4; seeds up to 4 3
- 2a. Mature ovary with 1 fertile locule (other locule rudimentary or aborted); drupe 1-seeded; pollen (4–) 5–6-colpate, colpi short (brevicolpate). *Mendoncia*
- 2b. Mature ovary with 2 fertile locules; drupe 2-seeded; pollen (fide Raj 1961) 3(–4)-colpate, colpi elongate. *Anomacanthus*

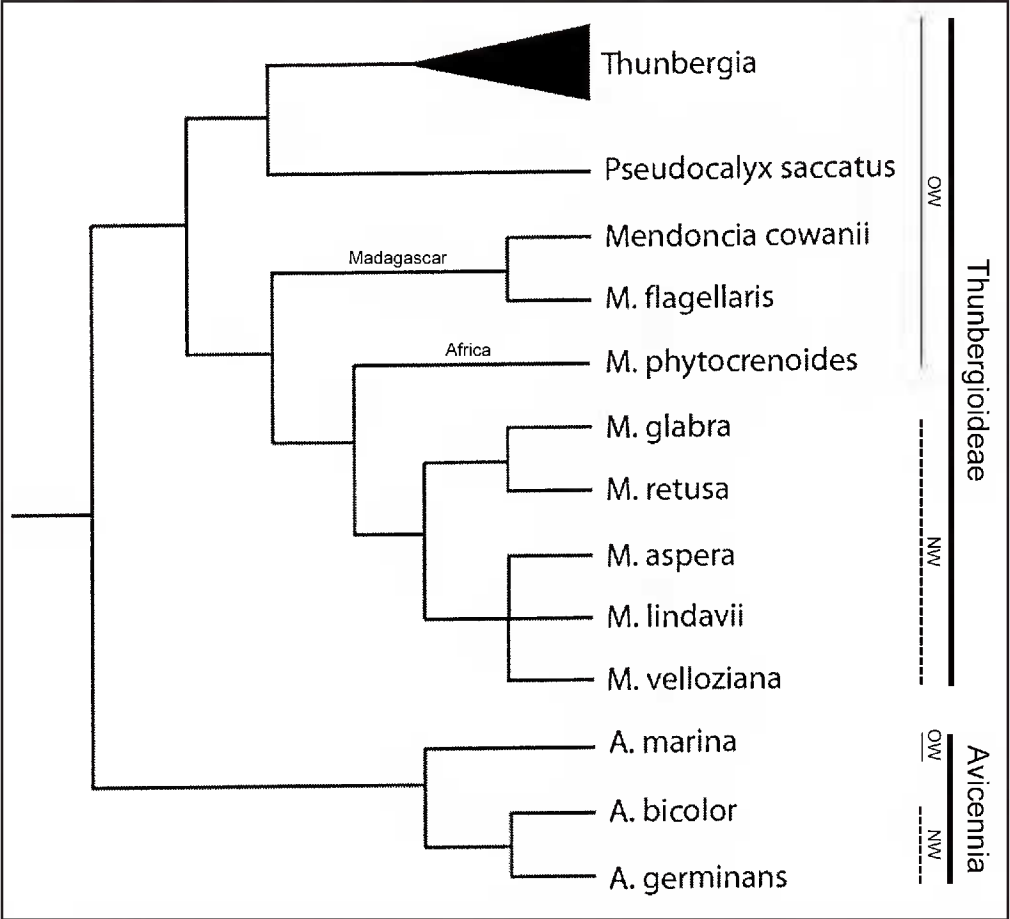


FIGURE 1. Phylogenetic relationships among genera of Acanthaceae subfamily Thunbergioideae and *Avicennia*. OW = Old World, NW = New World. Adapted from Borg et al. (2008).

- 3a. Stigma \pm equally 2-lobed, each lobe again divided into 2 unequal lobes; pollen 7–9-lobate and colpate. *Meyenia*
 3b. Stigma funnellform to \pm capitate or equally to unequally 2-lobed; pollen spiraperturate and unlobed. 4
 4a. Anthers opening by longitudinal slits. *Thunbergia*
 4b. Anthers opening by apical slits or pores. *Pseudocalyx*

MORPHOLOGY

HABIT.— All Paleotropical species of *Mendoncia* are woody vines (lianas) that climb tens of meters into the canopy by twining. The young stems are subquadrate to quadrate-sulcate in cross-section. Mature stems can reach upwards of 30 mm in diameter, are prominently multi-sulcate, usually twisted, and generally have swollen nodes. Initially, the young stems are glabrous or more or less evenly pubescent with yellowish, straw-colored, or golden-brown, eglandular trichomes; trichomes of the internodes soon become sparse with maturity. Bark is usually smooth to corky and light in color. The wood is soft and corky and contains raphides in the phloem.

LEAVES.— Leaves of *Mendoncia* are opposite-decussate and consist of a well-defined petiole and blade. Petioles are glabrous to pubescent and canaliculate. The blades are sometimes membranaceous, but more commonly subcoriaceous to coriaceous. They vary in shape from (lanceolate to) ovate to subdeltate to elliptic to subcircular to oblong to obovate to obcordate, but most often they are ovate to elliptic. The foliar margin is entire to sinuate, and can also be undulate and/or slightly revolute. The adaxial surface is darker green than the abaxial surface. Venation is brochidodromous (i.e., the secondary veins join together toward the margin in a series of prominent arches) with up to 5 orders of veins visible on dried material. The veins are flush with or slightly impressed into the adaxial laminar surface. The midvein and second order veins protrude prominently from the abaxial surface. The axils of the midvein with the secondary veins on the abaxial surface of some of the Malagasy species (especially *M. cowanii*) possess trichomes that form acarodomatia (for mites). Dense trichomes covering the surfaces of any plant may serve as refugia for mites, but there are four basic specialized forms of domatia: pouch, pit, pocket, and tuft types (O'Dowd and Willson 1989). In Malagasy species the domatia conform to the tuft type, and consist of dense tufts of intertwined trichomes in the vein axils (Figs. 2, 10B).

VESTURE.—Plants of Paleotropical *Mendoncia* have, almost exclusively, eglandular trichomes on vegetative structures. These trichomes are unbranched (antrorsely appressed to erect to flexuous) and branched (dendritic to stellate) and are unicellular to multicellular. They can occur on most vegetative and reproductive structures. The density of trichomes is variable within species. Leaves vary from glabrous to having one or both surfaces sparsely to densely pubescent with the trichomes sometimes restricted to major veins. Vegetative and reproductive organs may also be “mealy-glandular.” This designation refers to the presence of minute (mostly less than 0.5 mm in diameter), sessile glands or whitish pustules that sometimes appear somewhat papillose or mealy with age or on drying.

INFLORESCENCES.— Unlike most Acanthaceae, the inflorescence of *Mendoncia* consists of solitary or clustered (usually up to 10), pedunculate dichasia in the axils of leaves or on older and woody stems, from leafless nodes. Often in *M. flagellaris* the dichasia are borne in the axils of subfoliose bracts on pedunculate, axillary or terminal racemes. Some of the axillary racemes could be interpreted as the terminal portion of an axillary branch with one or two pairs of leaves at the base, and with the subfoliose bracts becoming progressively smaller distally. The dichasia of *M. lindaviana* are somewhat unusual by being arranged in a racemose fashion on woody, peg-like short-

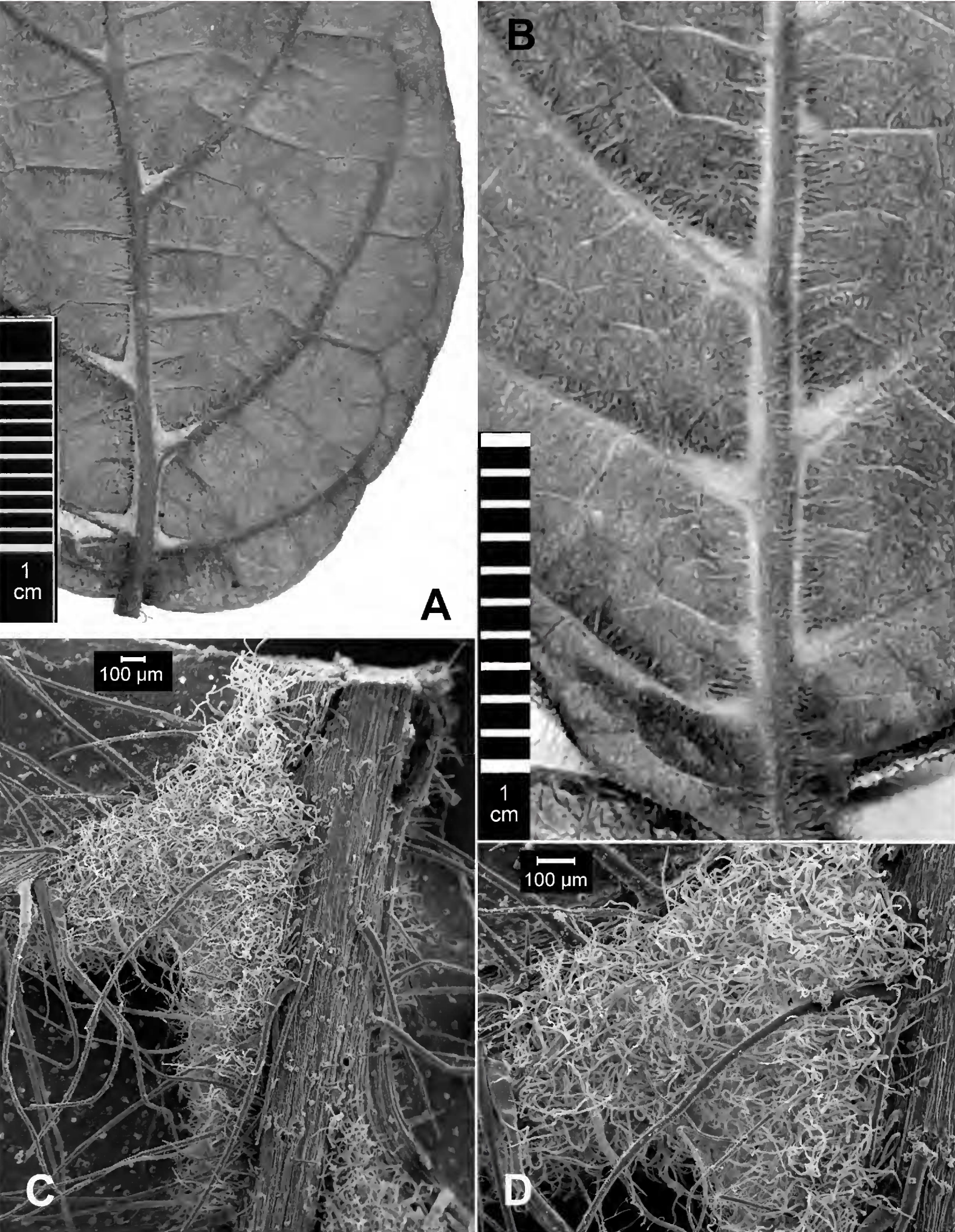


FIGURE 2. Domatia on abaxial surfaces of leaves of *Mendoncia cowanii* var. *cowanii*. A. Daniels 98. B. Daniel et al. 9116. C, D. Scanning electron micrographs of Daniel et al. 9116 showing intertwined trichomes in axils of midvein with secondary vein.

shoots from the usually leafless nodes of woody older growth (Fig. 3F, 17D). The short-shoots are sometimes multi-branched with each branch bearing several dichasia per year; thus, over several seasons, 100 or more peduncular scars may be evident on the branched short-shoot in this species. Peduncles of the dichasia are sometimes conspicuously flared at the apex, especially in fruit. Each dichasium generally produces only a single flower (with apparently inactive supernumerary buds at the base of flowers reported by Harshberger (1929) for a Neotropical species). Flowers are sessile to subsessile (or borne on a pedicel to about two mm long, or sometimes longer in fruit) in the axil of two isomorphic, conspicuous, and partially fused bracteoles. The bracteoles are connate when the flower is in bud, become partially free from the apex as the corolla matures, can become entirely free with age, and are either deciduous as the fruit matures or persist (sometimes spreading outward) around the mature fruit. Because the calyx is reduced to a ring of tissue at the base of the corolla, the bracteoles effectively function as an epicalyx that initially encompasses the entire floral bud and eventually subtends the mature flower. The bracteoles in most (if not all) species are filled with a watery fluid before and during anthesis, and thus function much like a “water calyx” (cf. Carlson and Harms 2007). Harshberger (1929) hypothesized that this fluid is secreted by capitate trichomes on the adaxial surface of the bracteoles in a Neotropical species. We observed glandular trichomes on the adaxial surfaces of bracteoles in several species of Paleotropical *Mendoncia*. Water calyces have been reported in several plant families (Endress 1996), and are thought to protect the flower buds from desiccation and/or insect herbivory (Carlson and Harms 2007; Burt and Woods 1975). Bracteoles are also variously pubescent and colored. Some plants of *M. flagellaris* exhibit a conspicuous pair of bulbous, white protuberances on the proximal portion of the abaxial surface of each bracteole (see discussion below; Figs. 11F and 13C, D). Bracteoles are mostly persistent on fruiting dichasia in some species and nearly always deciduous as the fruit matures in others. Characteristics of the bracteoles have been, and continue to be, of considerable importance in the characterization and identification of species because they are the most common (and often only) “fertile” element present on collections of the genus.

FLOWERS.—Flowers are sessile or very shortly pedicellate on (or in) the sometimes flaring apex of the peduncle (Fig. 19C). The calyx consists of a shallow, annular or cupular ring mostly one-half to two mm high with the margin entire, five-lobed with broadly triangular lobes, or shallowly and irregularly lobed (sometimes with a single prominent lobe). Although it is somewhat tubular during anthesis, the margin often flares outward and is sometimes conspicuously undulate with age. The abaxial surface varies from glabrous to pubescent. The calyx is often best observed in fruiting plants from which the bracteoles have dehisced. Internal to the calyx (evident after the corolla falls) is a somewhat fleshy or annular nectar disc (Fig. 10F) about two mm high that surrounds the base of the ovary. Corollas consist of a funnelform proximal tube that either gradually or more or less abruptly expands distally into a throat, which sometimes (e.g., *M. combreoides*) narrows toward mouth, and a bilabiate limb (Fig. 3C). The upper lip of the limb comprises two lobes and the lower lip consists of three lobes, the central of which is generally larger than the laterals. The lobes are convolute with left-contort aestivation in bud and are rounded to emarginate at their apices. Corolla color ranges from white to pink to purple, with some white corollas having purplish to pinkish markings on the internal surfaces of the lips and/or throat. Externally, flowers are glabrous. Glandular trichomes can be present on the internal surfaces of the lobes in several species. The androecium consists of four epipetalous stamens that are inserted near the middle of the corolla tube or near where the narrow distal portion of the tube is expanded into the throat. Stamens are didynamous with the pairs nearly equally inserted or with the ventral pair inserted distal to the dorsal pair. They are either included within the throat or partially exerted several millimeters beyond the mouth. Anthers consist of two subequally to unequally inserted, parallel, and lin-

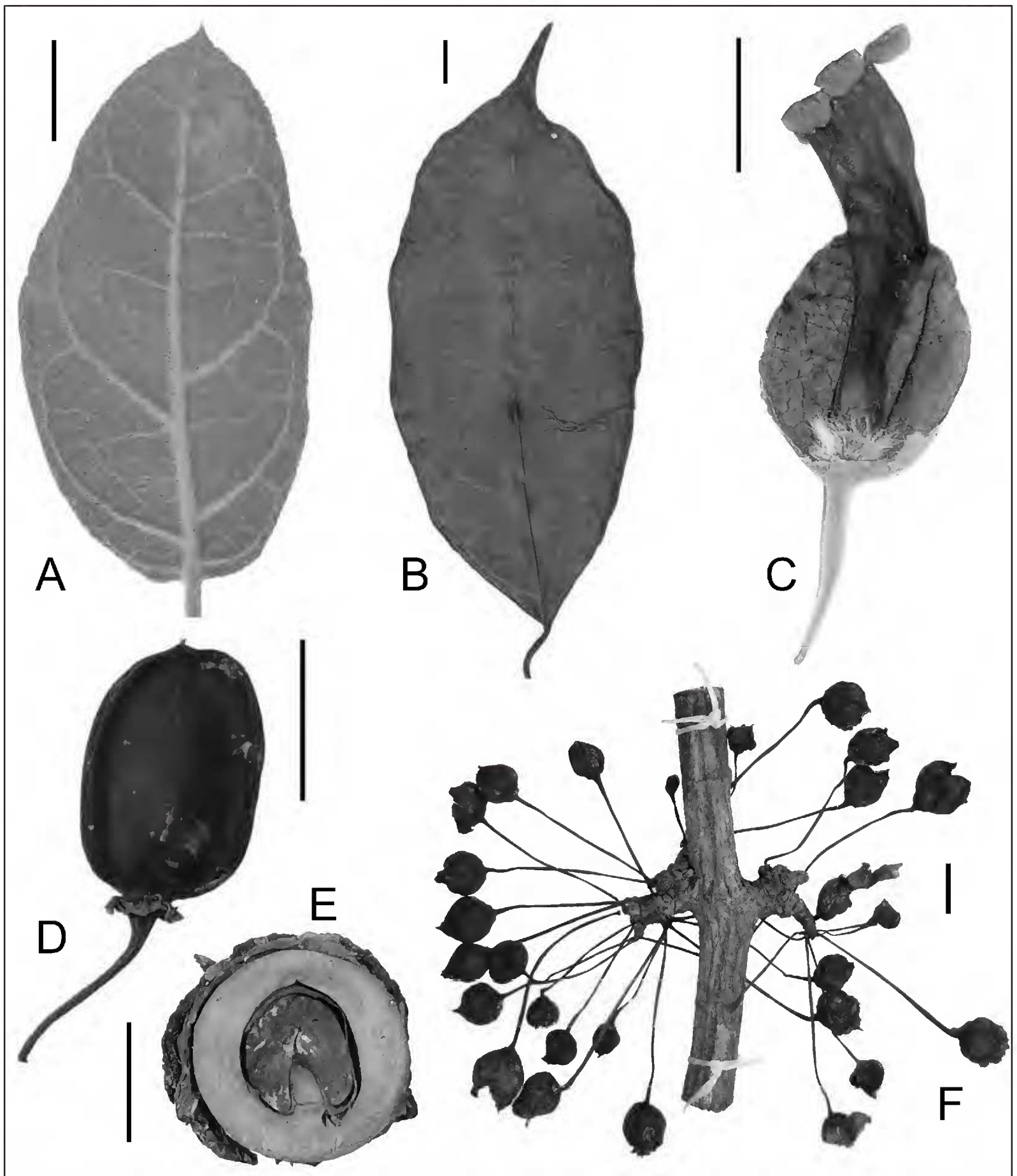


FIGURE 3. Morphological features of *Mendoncia* spp. A. Abaxial leaf surface of *M. cowanii* var. *coursii* (Rakotonandrasana 485). B. Abaxial leaf surface of *M. lindaviana* (Vermoesen 191). C. Dichasium of *M. cowanii* var. *coursii* (Rakotonandrasana 485) with one bracteole removed showing single flower with densely pubescent calyx. D. Oblong drupe of *M. lindaviana* (Louis *et al.* 275). E. Cross-section through dried drupe of *M. vinciflora* (Lewis *et al.* 1353) showing bony seed with embryo. F. Node of older shoot of *M. lindaviana* (Breteler *et al.* 8106) with dichasia borne on branched and woody short-shoots.

ear thecae that are either equal or unequal in size (Fig. 13F). Thecae open by short apical slits or pores and have a tuft of dense, short bristles either restricted to the base or becoming sparse and extending from there distally toward the apex or proximally along the filament. The filaments are short and intergrade with the connective. The connective usually extends up to several millimeters beyond the apex of the thecae. A staminode (rarely two staminodes), usually consisting of a sterile, finger-like projection, and sometimes also with small thecae, may develop between the dorsal (i.e., more proximally inserted) pair of stamens. The gynoecium consists of a bicarpellate, superior ovary, style, and capitate or equally to unequally bilobed stigma. The style and stigma are either included in the throat of the corolla or slightly exerted from the mouth. Anatomical studies on the development of the gynoecium (Schönenberger and Endress 1998) show it to be initially bicarpellate with each carpel containing 2 ovules. Only the abaxial carpel continues to develop, and only one of its ovules develops to maturity.

FRUIT.—Fruits of *Mendoncia* are drupes. The only other genus of Acanthaceae to exhibit this fruit type is *Anomacanthus* (see key above). Based on limited observations and images of fresh drupes, they are generally broadly ellipsoid to spherical in shape. Shapes used herein are based exclusively on dried drupes, which vary from ovoid to ellipsoid to oblong to spherical to obovoid. Drupes of *M. gilgiana* have an asymmetrically truncated apex due to the shape of its seed. Six species of Paleotropical *Mendoncia* (*M. combretoides*, *M. delphina*, *M. flagellaris*, *M. gilgiana*, *M. lindaviana*, *M. vinciflora*) have glabrous drupes while the remaining four species (*M. kely*, *M. cowanii*, *M. decaryi*, *M. phytocrenoides*) have pubescent drupes. Color of the drupes changes from green to greenish yellow when young to dark purple-black when mature. The single seed is bony, glabrous, and covered with a reticulum of shallow ribs on the external surface (Figs. 3E, 10G, 13I). Being only slightly smaller than the drupe, seeds of *Mendoncia* are among the largest in the Acanthaceae.

POLLEN

Examination of pollen from 12 herbarium specimens representing eight of the 10 Paleotropical species (Appendix 1) reveals it to have a polar diameter (P) of 23–38 μm and an equatorial diameter (E) of 23–41 μm . Grains can be described as subspheroidal to spherical (to euprolate) based on a P:E of 0.812–1.186, (4–) 5–6-brevicolpate, and subcircular to subtetragonal to subpentagonal in polar outline (Figs. 4, 5). The number of colpi is sometimes variable within a species (i.e., *M. cowanii*, *M. flagellaris*), but most species studied have some or all grains with five colpi. Four-colpate grains were more common among the four collections of *M. flagellaris* studied; indeed, grains with five apertures might be aberrant in that species (Fig. 5I). Six colpi were observed in two species (e.g., *M. cowanii* and *M. lindaviana*), and the exact number of colpi (either five or six) could not be determined for *M. kely* based on grains observed. Based on the limited samples studied, it is possible that further sampling might reveal additional variation in aperture number for other species. The relatively short colpi are linear (or becoming somewhat tapered at distal ends on swollen grains), 5.6–10.8 μm long (C), and have C:P = 0.17–0.36. The interapertural surfaces are finely rugulate with the rugulae smooth to microrverrucate to microgemmate to microbaculate (Fig. 6). Rugulae of pollen in some samples of *M. gilgiana* and *M. vinciflora* (Fig. 6E) appear smaller and/or less distinct than in other samples of these and other species. Damage to interapertural regions reveals the columellae underlying the tectum (Fig. 6F). In all of these sculptural attributes, pollen of species of *Mendoncia* from the Old World is similar to that of Neotropical species studied to date (e.g., Raj 1961; Daniel 1998 and unpublished observations). Daniel (1998) summarized other sources that have noted 3–6-colporate pollen for *Mendoncia*. Endoapertures, if present, were not visible in the unacetolyzed grains observed in our SEM preparations of Paleotropical species.

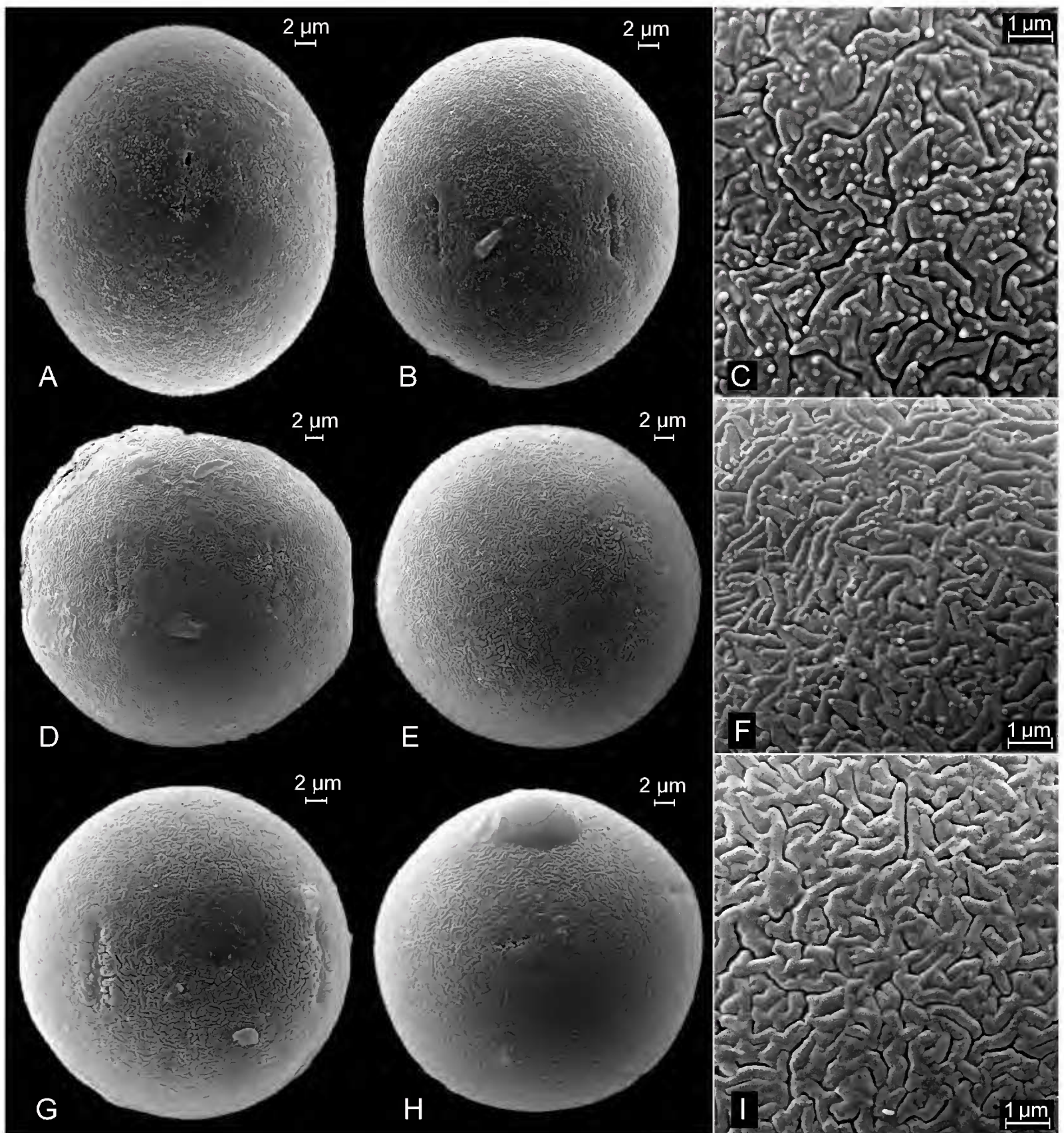


FIGURE 4. Pollen of *Mendoncia* spp. from Africa. A–C, *M. gilgiana* (Breteler 1834). A. Apertural view. B. Interapertural view. C. Rugulate (and densely microverrucate to microgemmate to microbaculate) exine. D–F, *M. lindaviana* (Hladik s.n.). D. Interapertural view. E. Oblique (or polar?) view. F. Rugulate (and sparsely microverrucate to microgemmate) exine. G–I, *M. phytocrenoides* (Letouzey 4306). G. Interapertural view. H. Polar view. I. Rugulate exine with smooth rugulae.

DISTRIBUTION AND HABITATS

Ten species of *Mendoncia* are found across tropical Africa and on the islands of Madagascar and Mayotte in the Indian Ocean. Occurrences of species by country are provided in Appendix 2. In mainland Africa four species (*M. combretoides*, *M. gilgiana*, *M. lindaviana*, *M. phytocrenoides*) range from Liberia and Guinea in the northwest to Kenya in the east and southward to southern Congo-Kinshasa (Figs. 7, 14, 18). Based on the phytochoria of White (1983), all African species and most occurrences of them are in the Guineo-Congolan region, with extensions into the Guinea-

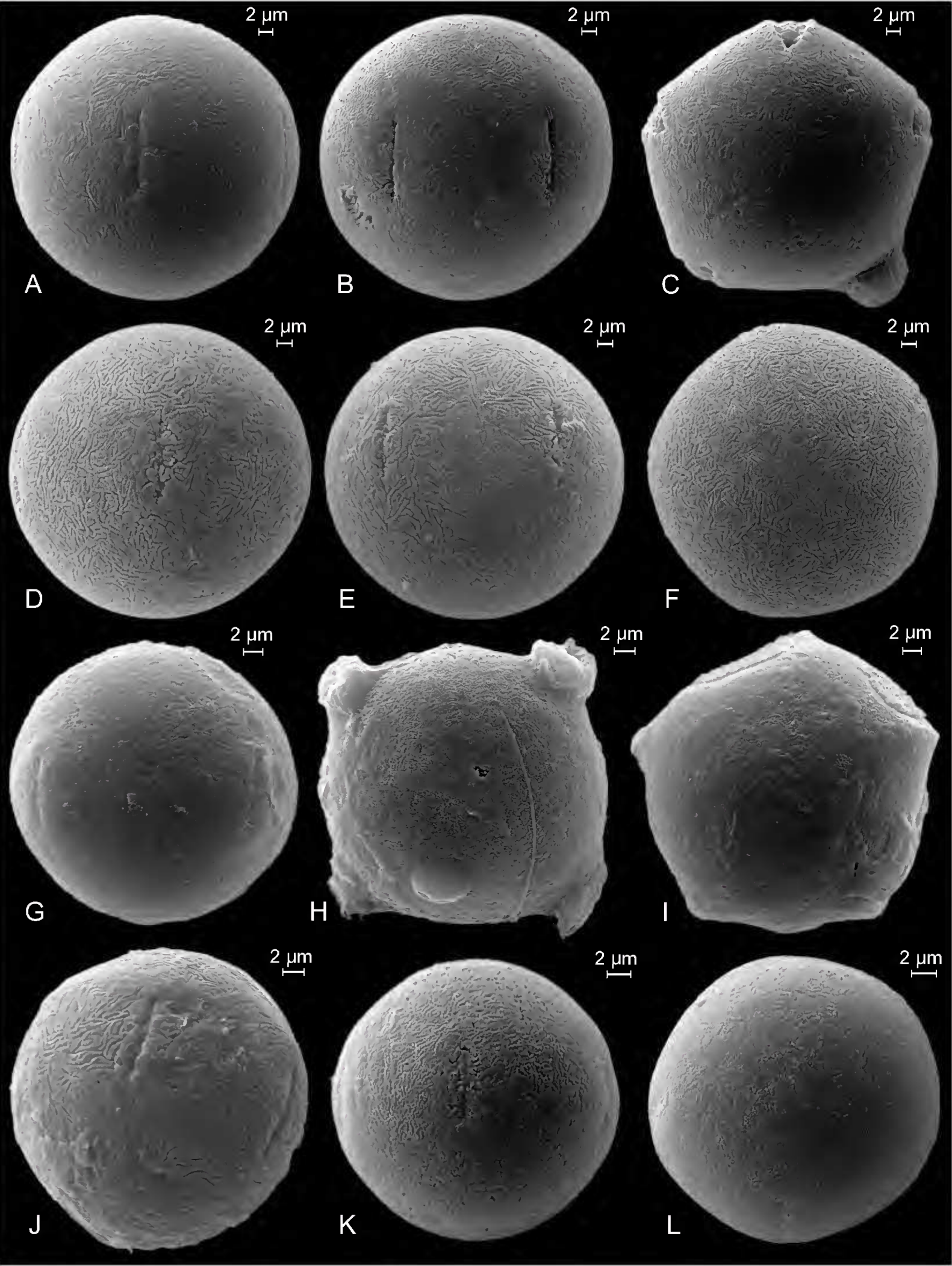


FIGURE 5. Pollen of *Mendoncia* spp. from Madagascar. A–C, *M. cowanii* (Daniel et al. 11000). D–F, *M. delphina* (Malcomber et al. 1665). G–I, *M. flagellaris*. G. Apertural view (Daniel et al. 9276). H. Polar view (4-aperturate grain; Daniel et al. 9131). I. Polar view (5-aperturate grain; Daniel et al. 9239). J, *M. kely* (Andrianantoanina et al. 11). Oblique view. K–L, *M. vinciflora* (Humbert & Capuron 25734). K. Apertural view. L. Polar view.

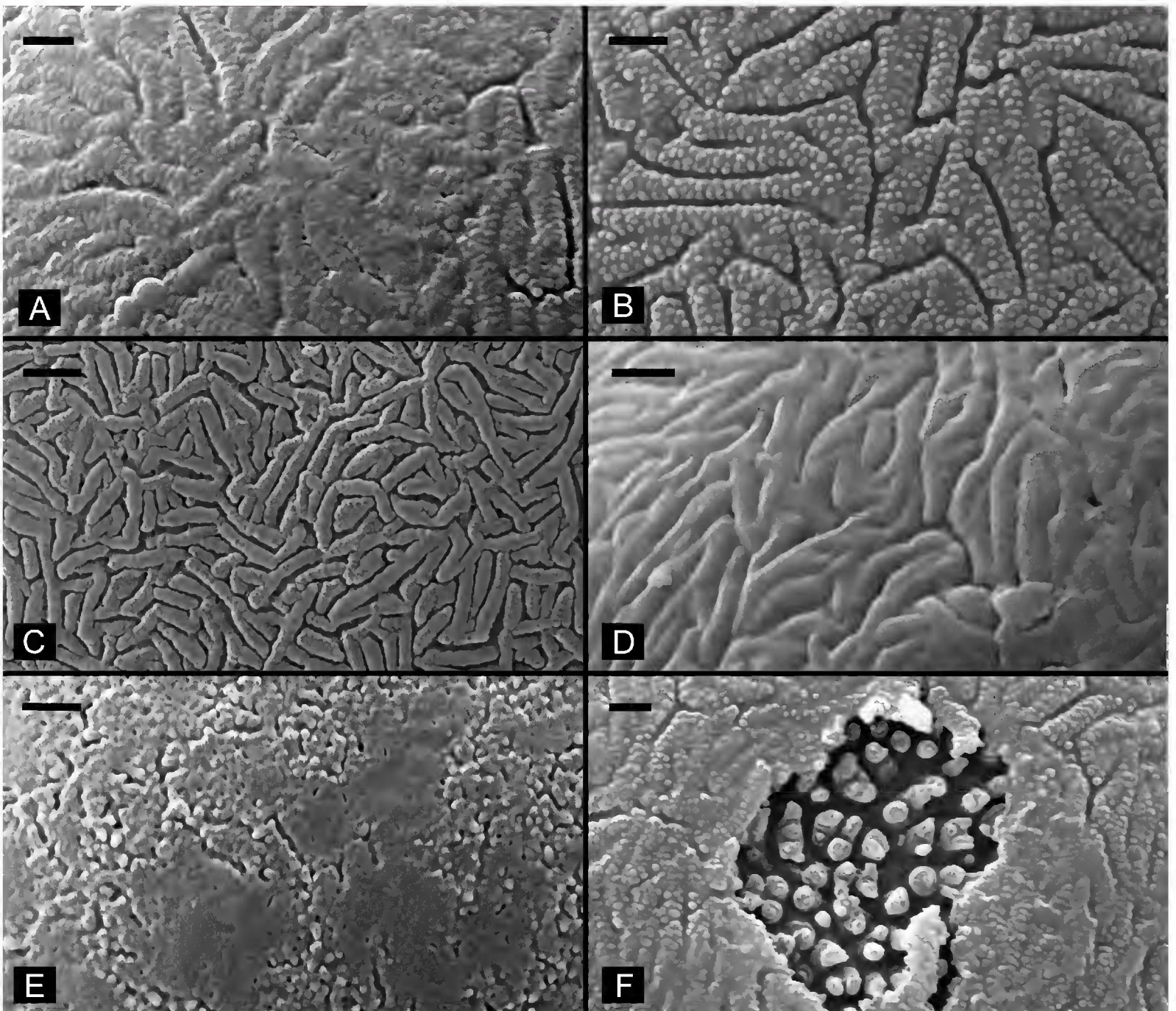


FIGURE 6. Interapertural surfaces of *Mendoncia* pollen from Madagascar. A. *M. cowanii* (Daniel et al. 11000), rugulae densely microverrucate to microgemmate. B. *M. delphina* (Malcomber et al. 1665), rugulae densely microverrucate to microgemmate. C. *M. flagellaris* (Guillaumet 4110), rugulae inconspicuously microverrucate to microgemmate. D. *M. kely* (Andrianantoanina et al. 11), rugulae smooth. E. *M. vinciflora* (Humbert & Capuron 25734), rugulae ± indistinct and densely microverrucate to microgemmate to microbaculate. F. *M. cowanii* (Daniel et al. 11000), tectum damaged and revealing underlying columellae. Scales = 1 µm.

Congolia/Zambezia, Guinea-Congolia/Sudania, and Lake Victoria regions. Habitats include primary and secondary, lowland to montane, moist to wet, semi-evergreen to evergreen forests; gallery and swamp forests; secondary bush; forest edges; roadside thickets; and grass fields. Plants occur at elevations from 60–1600 meters. *Mendoncia gilgiana* is the most widely distributed species of the genus in Africa, where it has an extent of occurrence (EOO; IUCN 2016) of 4,487,300 km² and occurs in 14 nations, whereas *M. combretoides* is the most geographically restricted, known from five nations of western Africa, and has an EOO of 565,420 km². We note intraspecific disjunctions of 800 km or more in the known occurrences of *M. combretoides*, *M. gilgiana*, and *M. phytocrenoides* in Africa. *Mendoncia gilgiana*, *M. lindaviana*, and/or *M. phytocrenoides* are sympatric in various parts of their ranges. *Mendoncia combretoides* occurs either sympatrically with, or within five to 10 kilometers of, *M. gilgiana*. The co-occurrences of continental African species is likely attributable to common habitat preferences.

All six species endemic to Madagascar occur primarily or exclusively in the lowland and mon-

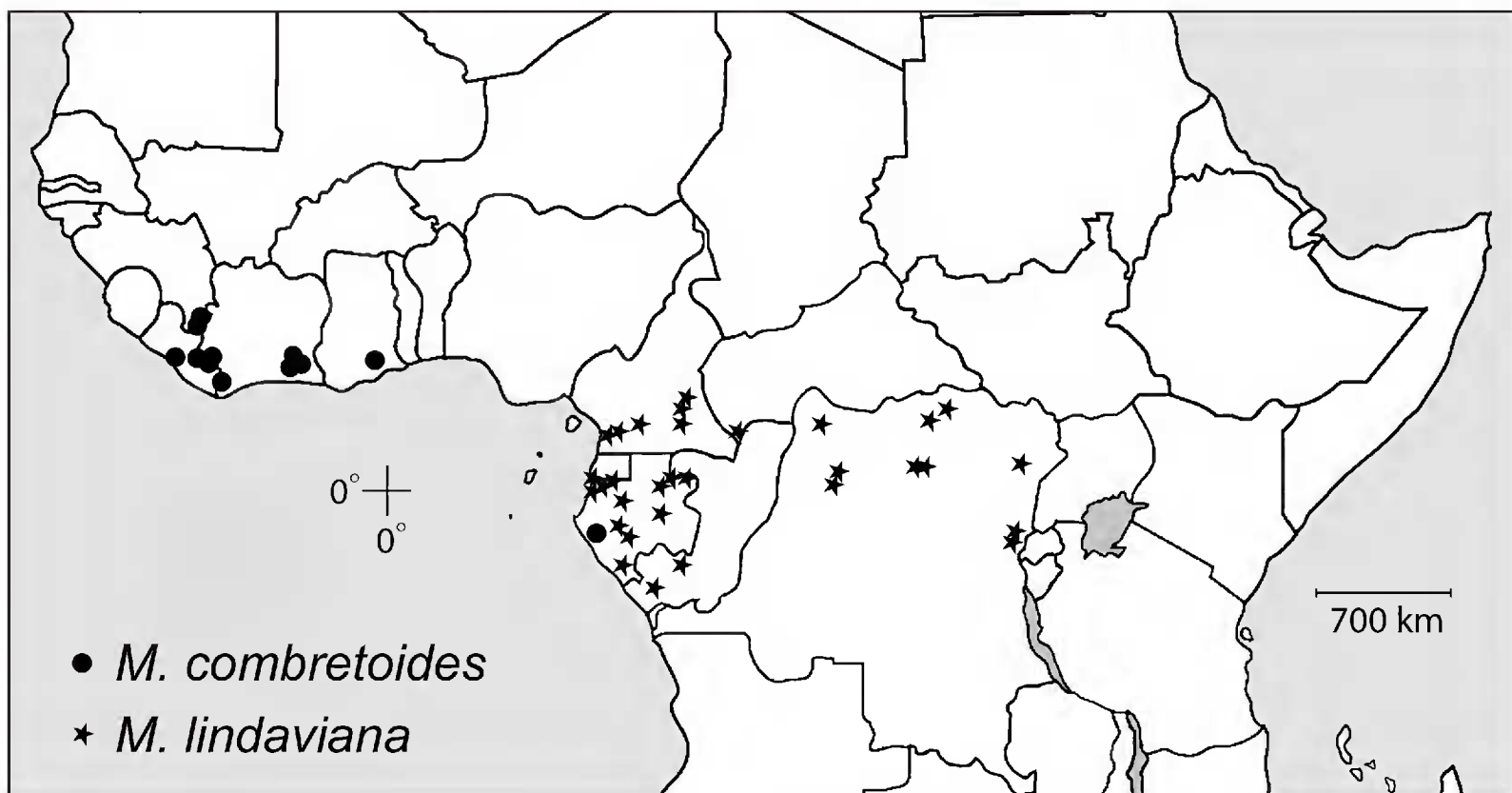


FIGURE 7. Map of central Africa showing distributions of *Mendoncia combretoides* and *M. lindaviana*.

tane regions in the eastern and northern portions of the island. They occur in primary and secondary (sometimes degraded), moist to wet evergreen forests (cf. perhumid, humid, and subhumid forests of Schatz and Rasolohery 2007); gallery forests; dry deciduous forests; coastal forests; and forest clearings and margins. Plants occur at elevations ranging from 5 to 2100 meters. *Mendoncia flagellaris* (EOO = 458,376 km²) is the most widely distributed species in Madagascar; it also occurs about 350 km to the west-northwest of the nearest occurrences on Madagascar in wet montane forests on the island of Mayotte in the Comoros Archipelago. *Mendoncia delphina* has the most restricted distribution (EOO = 134 km²) in Madagascar. Among Malagasy species of the genus, the only major intraspecific disjunction (more than 1000 km) is noted for *M. kely*. Like their African congeners, and probably due to similar habitat preferences, sympatry is not uncommon among Malagasy species. The ranges of *M. cowanii* and *M. flagellaris* overlap throughout wet forests in the provinces of Antsiranana, Antananarivo, Fianarantsoa, Mahajunga, Toamasina, and Toliara; and they often occur together. On the northern half of the island, these two species also occur with *M. vinciflora*, *M. kely*, and *M. decaryi*. In the south, they occur with *M. kely* and *M. delphina*. Because mainland Africa and Madagascar do not share any species, the six species endemic to Madagascar would appear to represent either paleoendemics that have since gone extinct on the continent or a radiation of taxa following one or more dispersal events to that island. It is noteworthy that all of the Malagasy taxa occur to the south of all African species.

REPRODUCTIVE BIOLOGY

Very little is known about the flowering periods, floral biology, or dispersal among species of *Mendoncia*. To better understand the ecological relationships of the Paleotropical species, we recorded flowering periods from herbarium specimens; made field observations, collected data and samples, and recorded information from herbarium specimens and literature on various aspects of the floral biology of *M. cowanii*; and reviewed literature for information on dispersal in the genus.

FLORAL PHENOLOGY.—In both Africa and Madagascar, species of *Mendoncia* occur in regions of tropical moist to wet forests that exhibit some degree of seasonality with respect to pre-

cipitation. The known months of flowering and fruiting for each taxon have been derived primarily from herbarium specimens, and the periods for both are summarized in the accounts below. Flowering periods are also shown in Table 1. Fruiting sometimes occurs simultaneously with flowering and continues after flowering has ended, or appears to occur only after flowering has ceased. Although wet vs. dry seasonality is somewhat complicated in tropical Africa due to a seasonal reversal on each side of the equator and local conditions, in general, to the north of the equator, the wet season occurs between March and November and a dry season occurs sometime between November and April. The three species that occur on both sides of the equator (*M. gilgiana*, *M. lindaviana*, and *M. phytocrenoides*) flower throughout the year. All studied collections of *Mendoncia combretoides* with flowers were collected north of the equator; they flower only during the wet season. The shorter (and more restricted) flowering period known for the latter species may be, at least partially, an artifact of fewer collections of it, and none in flower from south of the equator.

TABLE 1. Flowering periods of Paleotropical species of *Mendoncia*.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
<i>M. combretoides</i>			X	X	X	X	X	X				
<i>M. cowanii</i>		X	X	X	X	X	X	X	X			
<i>M. decaryi</i>		X	X	X								
<i>M. delphina</i>										X	X	
<i>M. flagellaris</i>	X	X	X							X	X	X
<i>M. gilgiana</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>M. kely</i>	X	X										
<i>M. lindaviana</i>	X	X	X	X	X	X		X	X	X	X	X
<i>M. phytocrenoides</i>		X	X	X	X	X	X	X	X			
<i>M. vinciflora</i>	X	X	X	X								X

In general for Madagascar, a rainy season occurs from December through March, and a dry season occurs from April through October. At least five of the Malagasy species of *Mendoncia* are known to flower during the rainy season, and four of them (*M. decaryi*, *M. flagellaris*, *M. kely*, and *M. vinciflora*) almost exclusively so. Although *M. cowanii* begins to flower in the latter half of the rainy season (with peak flowering near the end of the wet period), it continues to flower throughout the dry season. *Mendoncia delphina* is only known with flowers at the end of the dry season/beginning of the wet season. Perhaps only two Malagasy species, *M. cowanii* and *M. flagellaris*, are known from sufficient collections to accurately portray their flowering periods, which only partially overlap. These two species are sympatric throughout much of their respective ranges, and based on our field observations over several years in different seasons at sites of sympatry, only one of them is in flower at a time. It would be useful to study whether they rely on different seasonal pollinators/dispersers or whether the year-round production of flowers/fruits by the two species together helps to provide year-round sustenance for one or more common pollinators/dispersers.

FLORAL BIOLOGY.— Flowers of *Mendoncia* have funnelform corollas that are white to pink to purple to scarlet, sometimes with colored markings or nectar guides; anthers are included in the corolla tube or partially exserted from the mouth of the corolla; and the style/stigma is often exserted from the corolla tube, as well. This morphology and architecture suggests bee-, butterfly-, and/or

bird-pollination. Several authors report visitors to flowers of Brazilian species: hummingbirds to flowers of *M. velloziana* Mart. (e.g., Buzato 1990; Buzato et al. 2000; Braz et al. 2000; Abreu and Vieira 2004), and euglossine bees to flowers of *M. puberula* Mart. (Buzato 1990). We did not locate any published information on floral visitors and/or pollinators to Paleotropical species of *Mendoncia*. Here, we summarize and contribute data on various aspects of floral biology, primarily for the Malagasy endemic, *M. cowanii*.

We made observations and conducted studies of *M. cowanii* in Madagascar during 1–3 March, 2007 at Toamasina: Mantadia National Park (18°49'44.20"S, 048°25'58.70"E to 18°49'16.36"S, 048°26'8.05"E; *Daniel et al. 11000*, CAS, TAN), and on 6 March, 2007 at Fianarantsoa: Ranomafana National Park (21°15.73'S, 47°25.30'E; *Daniel et al. 11002*, CAS). Vegetation at both sites consists of moist to wet, evergreen forest at mid-elevations (ca. 975 meters at Mantadia and ca. 900 meters at Ranomafana). At the Mantadia site, a one kilometer transect was established along a road and flowers were tagged and observed over the three-day period at four sites along this transect. Ten large, unopened flower buds were tagged each day for two days. These flowers were monitored two to four times throughout daylight hours over the course of two to three rainless days, until all 20 flowers had withered or dehisced. Tagged flowers, which were accessible from the ground, were monitored and observed (with a hand-lens when needed) for time of corolla opening, presence of pollen on stigma, presence of pollen on corolla limb, visitation, changes in coloration, presence/absence of nectar and bracteolar fluid, and time of withering/dehiscence. Floral visitation was also observed for additional flowers in the forest canopy using binoculars. Additional flowers were tested for nectar volume and sucrose concentration. Nectar volume (standing crop) and percent sugar (sucrose equivalents) in the nectar were measured using 55 mm micropipettes and a calibrated pocket refractometer (Burlington + Stanley "Eclipse," model 45-03), respectively. Insects were collected using a net and stored in alcohol or pinned.

The dark pink flowers of *Mendoncia cowanii* at Mantadia are nocturnal and diurnal, open between sunset and sunrise (between 17:00 and 06:00), and persist up to between 25 and 30 hours prior to withering (or turning completely brown) or dehiscing. Floral rewards include nectar, pollen, and possibly bracteolar fluid. After visitation by insects, the limb of the corolla (with the lips/lobes at least partially reflexed; Fig. 11B) becomes discolored with whitish markings, which eventually turn brown, as does most of the limb when it eventually withers. This discoloration is not necessarily an indication of pollination, but often corollas with the whitish discoloration on the dark pink limb also had pollen present on the stigma and/or the limb. As the flowers are showy and open all day, multiple visits may occur to them, with or without simultaneous pollination.

Nineteen flowers (15 at Mantadia and four at Ranomafana) were sampled on the day the corollas opened between 06:00 and 15:30 for quantity and quality of nectar. Nectar varied in quantity from 0 to 32.3 μ l (mean = 7.4, standard deviation = 9.61). Of the six samples lacking measurable nectar, one was from a shaded area, had slight discoloration of the corolla limb, and had pollen on the stigma; another one was from a sunny site, had no discoloration of the corolla limb, and had not been pollinated; and similar observations were not recorded for the other four. The percent sucrose concentration (corrected for ambient temperatures) of the 13 nectar samples taken at irregular intervals between 06:00 and 15:30 ranged from 20.70 to 31.11 (mean = 26.77, standard deviation = 2.58). There did not appear to be any noticeable correlation between either nectar quantity or quality with respect to temperature or time of collection, but the sampling was inadequate to state this with any confidence.

Bracteolar fluid is abundant when flowers are in large bud (ca. 8 mm long) and at least during the early stages of the fully open corolla, but absent when buds are smaller (ca. 2 mm long) and generally by the time the flower, whose base it engulfs, dehisces. Two samples of the watery fluid

from bracteoles bearing large (9.5 to 11 mm long) buds, revealed it to be tasteless, odorless, and colorless; vary in quantity from 2.2 to 2.8 ml (an additional sample from Ranomafana had 2.6 ml of bracteolar fluid); and contain no detectable sucrose. Further chemical analysis of this plant-secreted fluid should be undertaken to reveal any antimicrobial, antifungal, or electrolytic properties, at least the former of which has been reported for secreted fluid in pitchers of *Nepenthes* (Buch et al. 2013). As a potential floral reward, the fluid may be obtained by a floral visitor via probing between the partially fused bracteoles and the corolla. Secondarily, it may be an alternative source of water for birds and other animals, and in turn an attractant for potential pollinators.

The most common visitors we observed on the floral/bracteolar unit (i.e., the single-flowered dichasium) were at least two species of passerine birds, possibly *Neomixis* sp. (either Common Jery or Green Jery), or *Newtonia* sp. (either Common Newtonia or Dark Newtonia), and *Nectarinia souimanga* (Souimanga Sunbird). Ten sightings of visits from two to five seconds for each flower were recorded during daylight hours over two days. The sunbird was observed probing within the flowers and bracteoles possibly foraging for nectar and/or bracteolar fluid, respectively. The second most common floral visitors were Lepidoptera with six observations over the two days. Butterflies and/or moths were observed probing the corolla tube and alighting on the lower lip for periods of three to 20 seconds per flower. Other floral visitors consisted of a solitary bee (*Thrinchosoma* sp.), which perched on and probed in the corolla tube; a dipteran (hover fly), which alighted on the limb of the corolla; and two genera of ants (*Crematogaster* sp. and *Paratrechina* sp.), which were seen inside and outside the corolla tube and along nearby stems. Effective pollinators remain undocumented for flowers of *M. cowanii*, but likely include at least some of the floral visitors noted above.

Of 18 flowers (14 at Mantadia and four at Ranomafana) monitored for evidence of pollination (i.e., pollen on stigma), 11 (61%) were pollinated, 6 (33%) were not, and one (6%) was questionable as to whether pollen was present or absent. All 18 flowers had clean stigmas and no discoloration of the limb when first observed in the early morning after the corollas opened. For those pollinated, both pollination and limb discoloration (likely indicating visitation) took place within three to six hours. Interestingly, two flowers that were not pollinated and had no discoloration of the limb, had pollen on the limb within three hours after sunrise. Autogamy, if present, would not appear to be pervasive; examination of five flowers from which the corollas had recently fallen revealed that none had pollen on the stigma. In the flowering population at Mantadia, young (green) fruits were evident at various stages of development.

Flowers of *M. flagellaris*, which differ from those of *M. cowanii* by their smaller corollas that are mostly white with purplish markings on the limb, were noted to be visited by unidentified hymenoptera according to the label of Birkinshaw 48.

DISPERSAL.—Plant taxonomists and primatologists have noted herbivory and frugivory of species of *Mendoncia* by lemurs in Madagascar (e.g., Birkinshaw 127, specimen label; Daniels 98, specimen label; Dew and Wright 1998; Tan 1999). In their summary of the literature on food plants of lemurs, Birkinshaw and Colquhoun (2003) noted frugivory for *Mendoncia* by six species of lemurs. Lemurs are relatively abundant in the moist to wet forests of northern and eastern Madagascar where most species of *Mendoncia* occur. It remains unclear whether lemurs are effective seed dispersers, but because whole seeds of *Mendoncia* have been found in their dung (Dew and Wright 1998), effective dispersal by these primates would appear possible. Other potential dispersers of *Mendoncia* fruits/seeds include fruit bats and frugivorous birds in both Africa and Madagascar, and frugivorous primates in Africa.

TAXONOMY

Taxonomy of Paleotropical *Mendoncia* has been (and remains to some extent) imperfectly resolved due to extensive variation in the characters traditionally used to distinguish species (e.g., pubescence, and size and shape of bracteoles and drupes) and the absence of sufficient flowering collections to fully characterize flowers in several taxa (e.g., *M. combretoides*, *M. cowanii* var. *coursii*, and *M. decaryi*). In the absence of comprehensive molecular phylogenetic studies of the genus, the following taxonomic account makes use of a morphological species concept, which uses suites of macro- and micro-morphological characters to delimit species.

Mendoncia Vell. ex Vand., *Fl. Lusit. Brasil.* 43. 1788. **LECTOTYPE** (designated by Leonard 1951).—*M. aspera* Ruiz et Pav. (as “*Mendozia aspera*”).

Engelia Nees in Alph. de Candolle, *Prodr.* 11:721. 1847. **LECTOTYPE** (designated by Leonard 1951).—*E. towarensis* Klotzsch. & H. Karst. ex Nees.

Monachochlamys Baker, *J. Linn. Soc., Bot.* 20:217. 1883 (“1884”). **TYPE**.—*M. flagellaris* Baker.

Afromendoncia Gilg ex Lindau, *Bot. Jahrb. Syst.* 17:111. 1893. **TYPE**.—*A. lindaviana* Gilg ex Lindau.

Lirayea Pierre, *Bull. Mus. Hist. Nat. (Paris)* 2:341. 1896. **TYPE**.—*L. floribunda* Pierre.

Lianas. Young stems subquadrate to quadrate-sulcate, glabrous or pubescent with eglandular, branched (stellate and dendritic) or unbranched trichomes. Leaves (membranaceous to) subcoriaceous to coriaceous, petiolate, petioles glabrous or pubescent, blades (lanceolate to) ovate to subdeltate to elliptic to subcircular to oblong to obovate to obcordate, surfaces somewhat discoloured (darker green adaxially than abaxially), glabrous or sparsely to densely pubescent with eglandular trichomes, especially along midvein, margin sometimes \pm revolute. Inflorescences of 1–10 (–20), pedunculate, 1-flowered dichasia borne in axils of leaves on young, herbaceous shoots (most species) or at leafless nodes on older woody stems (i.e., *M. lindaviana* and *M. phytocrenoides*) or in axils of subfoliose bracts on axillary or terminal racemes (i.e., often in *M. flagellaris*); flowers sessile or short-pedicellate in axil of 2 isomorphic bracteoles. Bracteoles opposite, sessile, (lanceolate to) ovate to elliptic to subcircular to oblong to obovate, rounded to acute and often apiculate at apex, truncate to rounded to subcordate at base, sometimes with a pair of prominent, bulbous, white protuberances basally (i.e., *M. flagellaris*) on the abaxial surface, bracteolar pair at least partially connate and filled with watery fluid through most of anthesis in most (or all?) species. Calyx a rigid, entire or variously lobed (sometimes with a single prominent lobe, and/or irregularly and shallowly multi-lobed), often undulating, annular or cupular ring surrounding a \pm fleshy nectar disc (evident after corolla dehiscence). Corolla funnelform, white, white with purple spots, pink, or purple, glabrous (or inconspicuously mealy-glandular) on external surface, glabrous or with glandular trichomes on internal surface of throat, tube ampliate distally into a throat, which sometimes (e.g., *M. combretoides*) narrows toward mouth, limb bilabiate with upper lip 2-lobed, lower lip 3-lobed, lobes convolute (left-contort) in bud, entire to emarginate at apex. Stamens 4, didynamous, inserted near the middle of corolla tube, included or barely exerted from mouth of corolla, anthers bitheous, thecae linear, subequally to unequally inserted, parallel, densely pubescent at least at base with a tuft of pointed or papilla-like bristles, dehiscing by apical pore or slit, connective usually extending 0.2–3 mm beyond apex of thecae, 1 (–2) staminode(s) often present. Pollen (4–) 5 (–6)-brevicolpate, interapertural surfaces rugulate. Ovary situated on a prominent, \pm fleshy or annular nectar disc, style included in or exerted from mouth of corolla, stigma equally to subequally 2-lobed or \pm capitate. Drupes (when dry) ovoid to ellipsoid to oblong to spherical to obovoid, glabrous or pubescent, 1-seeded. Seed bony, generally shaped like and slightly smaller than drupe.

A genus of about 90 species occurring primarily in the Neotropics, but with 10 species in tropical Africa, Madagascar, and on the island of Mayotte in the Comoros Archipelago. The generic description is derived exclusively from the Paleotropical species.

Key to Paleotropical Taxa of *Mendoncia*

(see Appendix 3 for regional keys to taxa in Africa and Madagascar/Mayotte)

- 1a. Young stems, petioles, peduncles, and abaxial surface of bracteoles pubescent with at least some branched (stellate to dendritic) trichomes; Africa 2
- 1b. Young stems, petioles, peduncles, and abaxial surface of bracteoles glabrous or pubescent with unbranched trichomes only; Africa and Madagascar. 3
- 2a. Inflorescences borne in leaf axils on young, mostly herbaceous, leafy stems; corollas 17.5–22 mm long; style 16–18 mm long; drupes mealy-glandular (lacking elongate trichomes); leaves 44–133 mm long and 23–86 mm wide *M. combretooides*
- 2b. Inflorescences mostly borne at naked nodes on older, woody, leafless stems; corollas 29.3–31.8 mm long; style 22.8–27 mm long; drupes pubescent with eglandular trichomes to 0.6 mm long; leaves 86–200 mm long and 57–114 mm wide *M. phytocrenoides*
- 3a. Inflorescences mostly borne on peg-like, woody, sometimes branched short-shoots at naked nodes on older, woody, leafless stems; drupe oblong (symmetrical); Africa . . . *M. lindaviana*
- 3b. Inflorescences borne in leaf axils on young, mostly herbaceous, leafy stems; drupe variously shaped, but rarely oblong (asymmetrical or symmetrical); Africa and Madagascar. 4
- 4a. Ovary and drupe glabrous or mealy-glandular (i.e., with inconspicuous, sessile glands mostly < 0.05 mm in diameter), lacking elongate, eglandular trichomes; calyx glabrous or sparsely pubescent 5
- 4b. Ovary and drupe pubescent with elongate, eglandular trichomes; calyx usually densely pubescent 8
- 5a. Bracteoles mostly persistent in fruit, usually pubescent with trichomes up to 3 mm long; drupe 6.8–11.8 mm long, \pm irregularly shaped (overall obovoid) and widest at or just below the truncate to shallowly acute (symmetrically or asymmetrically) apex; Africa *M. gilgiana*
- 5b. Bracteoles mostly deciduous in fruit, if pubescent, then with trichomes up to 1.2 mm long; drupe 9.5–30 mm long, variously shaped and sometimes obovoid, but not as described above; Madagascar. 6
- 6a. Corollas pink or light to dark purple, 20–35 mm long, upper lip 10–17 mm long; bracteoles usually lacking dense pubescence at apex of adaxial surface; extension of connective beyond anther thecae pubescent with glandular and eglandular trichomes 0.1–0.3 mm long; drupe subspherical to spherical, 14.8–25 mm in diameter; northern Madagascar. *M. vinciflora*
- 6b. Corollas white and usually with purple markings near base of limb and/or throat (rarely purplish in *M. delphina*), 8–18.5 mm long, upper lip 2–12.5 mm long; bracteoles with dense pubescence at apex of adaxial surface; extension of connective beyond anther thecae (if present) glabrous to minutely glandular; drupe ovoid-ellipsoid to ellipsoid to spherical to obovoid, 6–15.7 mm in diameter; widespread 7
- 7a. Dichasia 1–2 in axils of leaves; apex of leaf blade acuminate to caudate, with tail-like apex to 12 mm long; bracteoles yellowish, lacking a pair of conspicuous, whitish, bulbous, gall-like basal protuberances; pollen 5-aperturate; southern Madagascar *M. delphina*
- 7b. Dichasia 1–4 (–8) in axils of leaves or commonly in axils of bracts in an a raceme to 15 cm long; apex of leaf blade (acuminate) to acute to rounded to truncate to retuse, and sometimes with an apiculum to 1.6 mm long; bracteoles green, often with a pair of conspicuous, whitish, bulbous, gall-like basal protuberances; pollen mostly 4-aperturate; widespread. . *M. flagellaris*

- 8a. Corollas 13.2–19 mm long, tube 10–14 mm long; leaf blades mostly with length:width 1.4–1.7 *M. kely*
- 8b. Corollas 26–49 mm long, tube 20–38; leaf blades mostly with length:width 1.7–2.8. 9
- 9a. Corollas white with purplish markings, limb 20.6–32.4 mm in diameter, upper lip 13.5 mm long with lobes 8–10 mm long and 11.2–13.2 mm wide, lower lip 16.5–19 mm long with lobes 9.4–13.5 mm long and 12.2–15.2 mm wide. *M. decaryi*
- 9b. Corollas light pink to dark pink (sometimes whitish externally), limb 6–21 mm in diameter, upper lip 1.8–10 mm long with lobes 1.8–7.4 mm long and 3.7–8.6 mm wide, lower lip 3–12.4 mm long with lobes 2.2–7.5 mm long and 3.4–9.1 mm wide. 10
- 10a. Young stems, petioles, abaxial surfaces of leaf blades and bracteoles, and peduncles subglabrous and/or pubescent with erect to flexuose to antrorse trichomes, underlying surfaces plainly visible; corolla with upper lip 4.4–10 mm long and lobes of lower lip 3.5–7.5 mm long and 3.5–9.1 mm wide *M. cowanii* var. *cowanii*
- 10b. Young stems, petioles, abaxial surfaces of leaf blades and bracteoles, and peduncles densely pubescent with flexuose-interwoven trichomes such that underlying surfaces not visible (or only partially so on abaxial surface of leaf blades); corolla with upper lip 1.8–3.6 mm long and lobes of lower lip 2.2–3.3 mm long and 3.4–3.5 mm wide *M. cowanii* var. *coursii*

1. *Mendoncia combretoides* (A. Chev.) Benoist, *Notul. Syst. (Paris)* 11:143. 1944. *Thunbergia combretoides* A. Chev., *Explor. Bot. Afrique Occ. Franç.* 1:490. 1920. **TYPE.**—IVORY COAST. **Bas Sassandra:** bassin du Cavally, pays des Tépos, village de Grabo, [ca. 04°55'02.14"N, 007°29'35.69"W], 4 Aug 1907, *Chevalier 19745* (lectotype, designated here: P-00435313-photo!; isolectotypes: P-00435314!, P-00435315-photo!).

Young stems evenly and densely pubescent with yellowish- to golden-brown, mostly branched (sometimes also with some unbranched and antrorse) trichomes 0.2–1 mm long, trichomes of internodes soon becoming sparse to nearly glabrous. Leaves subcoriaceous to coriaceous, petioles to 25.4 mm long, pubescent with cauline type trichomes, blades ovate to elliptic to obovate-elliptic, 44–133 mm long, 23–86 mm wide, rounded to truncate to subcordate at base, acuminate to acute-apiculate to rounded to slightly emarginate at apex, abaxial surface pubescent with scattered, branched trichomes 0.2–0.4 mm long, trichomes often restricted to major veins, adaxial surface glabrous to sparsely pubescent with branched trichomes 0.2–0.4 mm long and unbranched, antrorsely appressed trichomes to 1 mm long, trichomes usually restricted to midvein. Inflorescences borne in leaf axils on young, mostly herbaceous and leafy stems, solitary or opposite at nodes, dichasia 1–4 (–6) per axil, peduncles to 23 mm long, pubescent like young stems. Bracteoles yellowish brown to pale green, mostly persistent in fruit, elliptic to ovate-elliptic, 15–21 mm long, 7–13 mm wide, rounded at base, acute-apiculate at apex, abaxial surfaces densely pubescent with cauline type trichomes (sometimes becoming sparse to nearly absent on older bracteoles), adaxial surface glabrous or mealy-glandular. Calyx mealy-glandular and sometimes with sparse branched trichomes like those of young stems. Corolla white, 17.5–22 mm long, externally glabrous (or minutely mealy-glandular), tube 17–18 mm long, internally pubescent at base of stamens with glandular trichomes 0.2–0.5 mm long, limb 6.5 mm in diameter, lower lip ca. 4 mm long. Stamens not seen. Style 16–18 mm long, glabrous to minutely glandular, stigma subcapitate to subequally 2-lobed, lobes 0.1–0.4 mm long. Drupe ovoid to ± ellipsoid to obovoid, 16–19 mm long, 10–15 mm in diameter, surface glabrous to mealy-glandular.

PHENOLOGY.— Flowering: May–August; fruiting: February, August–November.

DISTRIBUTION AND HABITATS.— Tropical western Africa (Gabon, Ghana, Guinea, Ivory Coast,

Liberia; EOO = 565,420 km²; Fig. 7). Plants occur in lowland and montane, moist to wet, ever-green forests; secondary forests; gallery forests; swamp forests; and grass fields. Elev. 100–850 m. Occurrence of plants is higher in forests where rainfall is between 1500–2500 mm/yr (Holmgren et al. 2004).

ILLUSTRATION.— Fig. 8.

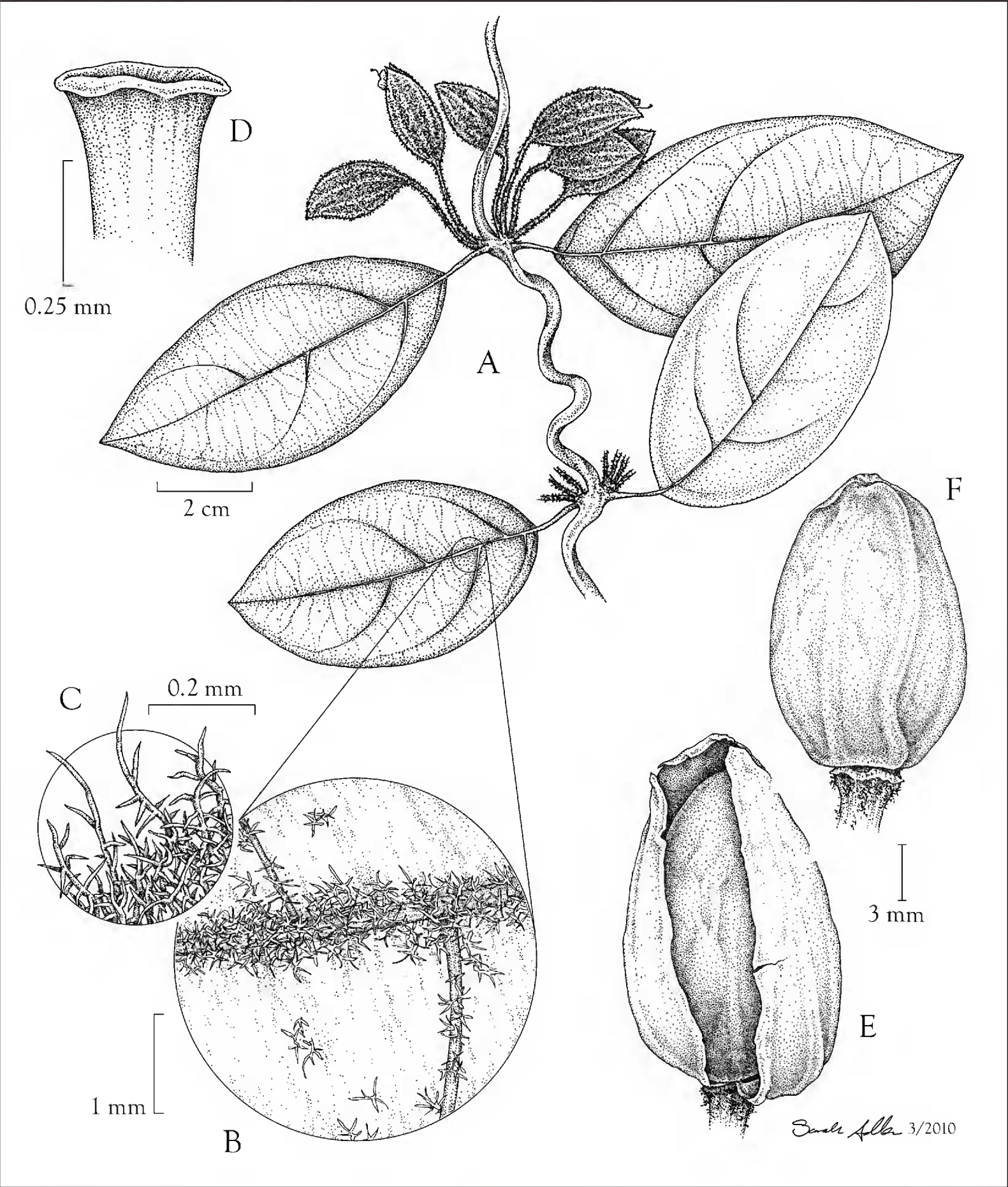


FIGURE 8. *Mendoncia combretoides*. A. Habit (Chevalier 19600, habit; Jansen 2556, inflorescence). B. Portion of mid-vein and secondary veins on abaxial surface of leaf (Jansen 2556). C. Enlargement of trichomes on mid-vein of abaxial surface of leaf (Jansen 2556). D. Apex of style and stigma (Jansen 2556). E. Drupe with persistent bracteoles (Adam 24131). F. Drupe with bracteoles removed (Adam 24131). Drawn by Sarah Adler.

Chevalier (1920) listed two of his collections, 19600 and 19745, in the protologue. *Chevalier 19745* (P-00435313) is here designated as the lectotype based on the descriptive notes found on the specimen label.

Lock & Hall GC 44752 from Ghana differs from most other collections by the acute to subattenuate bases of the leaf blades. *McPherson 15543* from Gabon was identified as *M. gilgiana* by Vollesen. A duplicate of this collection at K was annotated by Breteler as an undescribed new species, "*M. rabiensis* Breteler." Using the keys to species herein, this collection conforms very nicely to *M. combretoides* (e.g., branched trichomes on young stems, petioles, peduncles, and abaxial surface of bracteoles; inflorescences borne at nodes of younger, leafy stems, etc.), but was collected beyond the currently known distributional range of that species. It differs from most collections of *M. combretoides* only in the relative sparseness of the branched trichomes and the somewhat narrower leaves. However, similarly narrow leaves are known among *M. combretoides* in western Africa (e.g., *Chatelain & Téhé 9366* from Ivory Coast), and *M. gilgiana* shows similar variation in leaf form. *McPherson 15543* is a fruiting collection that lacks flowers; thus, its ultimate identity should be reevaluated when flowers are available. However, based on the preponderance of characters available, it seems reasonable to treat this collection as *M. combretoides*, and a range extension of ca. 1470 kilometers to the southeast of its nearest known occurrence in Ghana.

ADDITIONAL SPECIMENS EXAMINED.—GABON: **Ogooue-Maritime:** near Rabi, Shell Oil camp, 01°55'S, 009°55'E, *McPherson 15543* (K, MO). GUINEA. **Lola:** Nimba Mountains, Gouan Valley, 07°41.4'N, 008°22.9'W, *Jongkind et al. 8377* (FHO, MO). GHANA. **Eastern:** Atewa Range Extension F.R., [ca. 06°08'07.11"N, 000°37'12.27"W], *Lock & Hall GC 44752* (K). IVORY COAST. **Agnebi:** Forêt de Yapo, *Aké Assi s.n.* (MO); Agboville, Forêt de la Mamo, 05°44'N, 004°06'W, *Chatelain & Téré 712* (G); Réserve du Yapo [ca. 05°43'23.60"N, 004°05'41.47"W], *Cremers 556* (P); Agboville, S part of Yapo Forest, ca. 05°51'N, 004°08'W, *de Kruif 688* (CAS); KM 9 of Yakassé–Mé-Kodiousou road [05°49'N, 03°54'W], *Leewenberg 8042* (K, MO); Sous-préfecture, Azaguié, Forêt de Yapo, 05°44'N, 004°08'W, *Téré 1955* (G); Agboville, Forêt de Yapo, 05°45'N, 004°10'W, *Téré 2528* (G). **Bas Sassandra:** bassin du Cavally, pays des Tépos, entre Nékaougnié et Grabo, *Chevalier 19600* (K, P-00435310-photo only; P-00435311-photo only; P-00435312). **Lagunes:** 9 km W of Bécédi [ca. 05°37'53.49"N, 004°39'12.91"W], *Leeuwenberg 7908* (K, MO). LIBERIA. **Grand Bassa:** along the road from Tapita to Tchien, 13 mi NE of Tobli, [ca. 06°01'22.91"N, 009°52'57.98"W], *Jansen 873* (K, MO). **Grand Gedeh:** Webo District, Gletown, *Baldwin 6764* (K); along the road from Tchien to Zwedru Fijnhout exploitation, near Cavalla river, *Jansen 2556* (K, MO). **Nimba:** Yéképa, Granfield, Mt. Nimba, *Adam 24131* (MO); Yéképa, Nimba, Mont Alpha (mine) upper Jiti River, *Adam 27577* (CAS, MO, P); Gangra, *Adam 30077* (MO); Grassfield [07°29'10.44"N, 008°34'12.54"W], *Adam 31567* (MO); banks of Yiti River, 07°28.74'N, 008°34.22'W, *Jongkind & Bilivogui 9655* (K). **County unknown:** without locality, *Yallah 122* (K).

2a. *Mendoncia cowanii* (S. Moore) Benoist, *Bull. Mus. Hist. Nat. (Paris)*. 31:387. 1925. *Afromendoncia cowanii* S. Moore, *J. Bot.* 44:150. 1906. *Monachochlamys cowanii* (S. Moore) S. Moore, *J. Bot.* 67:226, in clavi. 1929. **TYPE.**—MADAGASCAR. **Fianarantsoa:** Tanala, [ca. 21°51'30"S, 47°26'30"E], 1880, *Deans Cowan s.n.* (lectotype, designated here: BM-000930924-photo!). **var. *cowanii***

Afromendoncia madagascariensis S. Moore, *J. Bot.* 44:150. 1906. *Mendoncia madagascariensis* (S. Moore) Benoist, *Bull. Mus. Hist. Nat. (Paris)* 31:387. 1925, non Radlk. (1884). *Monachochlamys madagascariensis* (S. Moore) S. Moore, *J. Bot.* 67:227, in clavi. 1929. **TYPE.**—

Province unknown: Central Madagascar, *Baron 3810* (lectotype, designated here: BM-000930923-photo!; isolectotypes: K-000393676 photo!, P-00493668!).

Young stems subglabrous to pubescent with an understory of mostly erect, unbranched, eglandular trichomes $< 0.05\text{--}0.2$ mm long, and an overstory of yellowish, antrorse to flexuous, unbranched, eglandular trichomes $0.3\text{--}2$ mm long, sometimes either overstory or understory trichomes soon breaking off or deciduous. Leaves membranaceous to coriaceous, petioles to 17 mm long, pubescent like young stems, blades ovate to elliptic (to obovate), $25\text{--}120$ ($\text{--}140$) mm long, $(11\text{--}) 16\text{--}63$ ($\text{--}77$) mm wide, (acute to) rounded (to subcordate) at base, acute to acute-apiculate to acuminate at apex, abaxial surface pubescent with cauline type trichomes (sometimes denser on major veins), except with trichomes sometimes erect and overstory trichomes up to 3 mm long, domatia consisting of dense tufts of interwoven trichomes often conspicuous in axils of primary and secondary veins on abaxial surface as well, adaxial surface sparsely pubescent with erect to antrorse, unbranched, eglandular trichomes to 1 mm long, trichomes often denser on or mostly restricted to midvein and often with conspicuous pustulate bases. Inflorescences borne in leaf axils on young, mostly herbaceous and leafy stems, solitary or opposite at nodes, dichasia 1–3 per axil, peduncles to 47 mm long, pubescent like young stems. Bracteoles green (sometimes tinged with maroon) to dark purplish, mostly deciduous as fruit matures, ovate to elliptic to obovate, $(11\text{--}) 16\text{--}31$ mm long, $7\text{--}20$ mm wide, rounded at base, rounded to rounded- to acute-apiculate at apex, apicule to 1 mm long, abaxial surface mealy-glandular and pubescent with erect to flexuose, unbranched, eglandular trichomes $0.2\text{--}2$ mm long, adaxial surface mealy-glandular. Calyx glabrous to densely pubescent with erect to antrorsely appressed, unbranched, eglandular trichomes $0.05\text{--}2$ mm long. Corolla light pink to dark pink (sometimes whitish externally), externally glabrous, internally glabrous, $26\text{--}45$ mm long, tube $20\text{--}38$ mm long, limb $6\text{--}21$ mm diameter, upper lip $4.4\text{--}10$ mm long with lobes emarginate, reflexed, $2\text{--}7.4$ mm long and $3.7\text{--}8.6$ mm wide, lower lip $5.7\text{--}12.4$ mm long with lobes emarginate, reflexed, $3.5\text{--}7.5$ mm long and $3.5\text{--}9.1$ mm wide. Stamens $7\text{--}10$ mm long, ventral pair inserted ca. 1 mm distal to dorsal pair, thecae $3.6\text{--}6.1$ mm long, densely pubescent at base with a tuft of bristles $0.1\text{--}0.3$ mm long, connective extending $0.2\text{--}0.4$ mm beyond thecae, extension of connective attenuate, glabrous, staminode not seen. Pollen $5\text{--}6$ -colpate, $E = 37\text{--}41$ μm , $P = 36\text{--}38$ μm , $P:E = 0.974\text{--}0.980$, $C = 10\text{--}10.8$ μm , $C:P = 0.263\text{--}0.297$, rugulae microverrucate to microgemmate. Style $20\text{--}32.5$ mm long, glabrous throughout or sometimes proximally pubescent with eglandular trichomes, stigma subequally 2-lobed with lobes $0.1\text{--}0.5$ mm long. Drupe ovoid to ellipsoid to oblong, $11\text{--}21$ mm long, $6.6\text{--}17$ mm diameter, surface mealy-glandular and pubescent with yellowish, erect to flexuose to antrorse, unbranched, eglandular trichomes to $0.1\text{--}3$ mm long.

PHENOLOGY.— Flowering: February–September with peak flowering February–March; fruiting: August–December.

DISTRIBUTION AND HABITATS.— Eastern Madagascar (Antananarivo, Antsiranana, Fianarantsoa, Toamasina, Toliara; EOO = $298,998$ km²; Fig. 9). Plants occur in lowland to montane to cloud, primary and secondary, moist to wet, evergreen forests. Elev. $50\text{--}1200$ m.

ILLUSTRATIONS.— Benoist (1967:5, Fig. 1); Figs. 10, 11A–D.

In the protologue of *Afromendonia cowanii*, Moore (1906) cited an unnumbered collection of Deans Cowan at BM and *Baron 289* at K. The lectotype designated above is the more complete specimen (e.g., containing flowers, which are described in the protologue). The lectotype of *Afromendonia madagascariensis* is chosen from the two collections of Baron from “central Madagascar” cited in the protologue. *Baron 3810* was noted by Moore (1906) to contain flowers and fruits, whereas *Baron 1448* was noted to be a fruiting collection. The protologue has descriptions

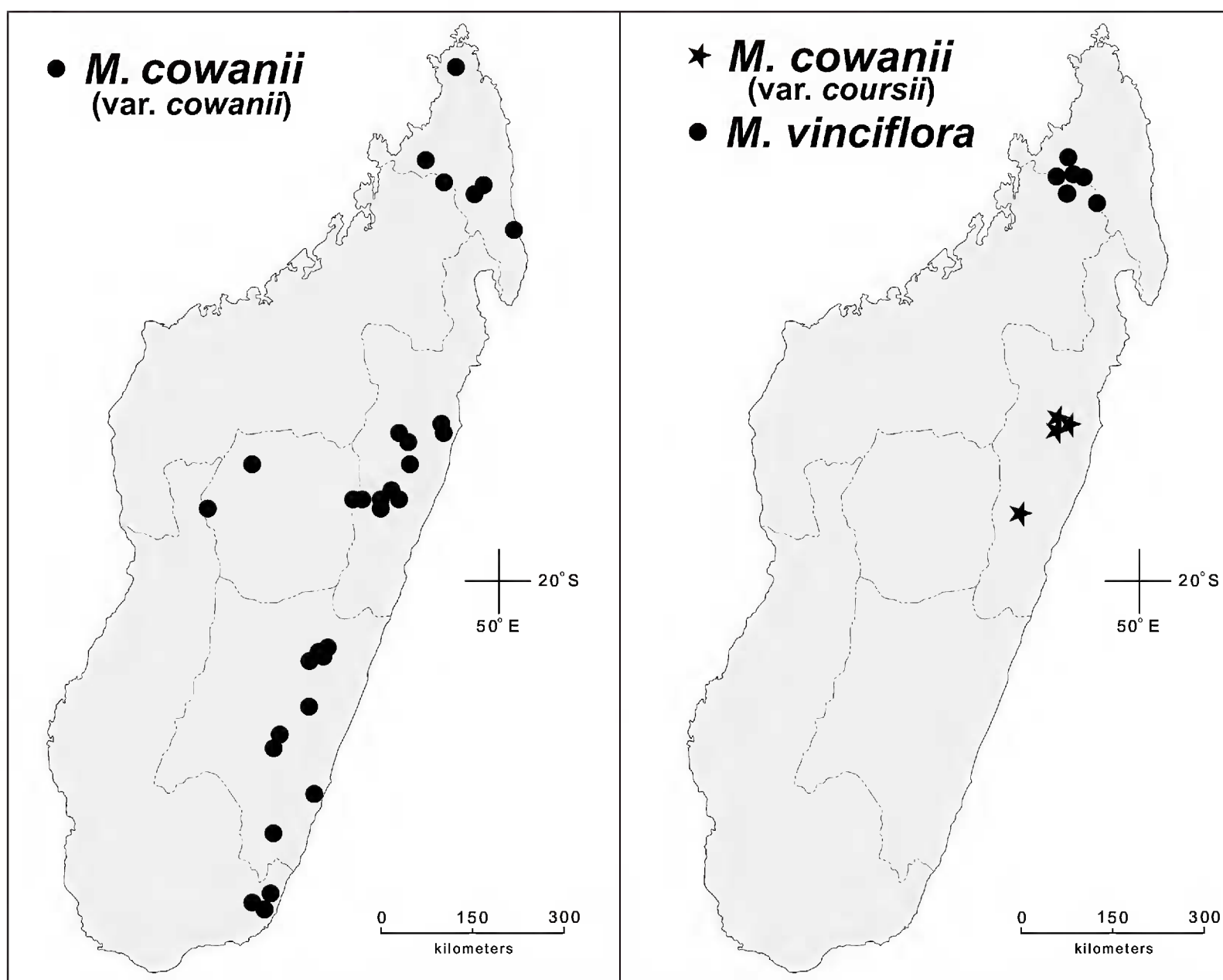


FIGURE 9. Maps of Madagascar showing distributions of *Mendoncia cowanii* var. *cowanii*, *M. cowanii* var. *coursii*, and *M. vinciflora*.

of both flowers and fruits. The lectotype at BM is particularly complete, and better reflects information in the protologue than the isolectotype at K, which contains the major set of Baron's collections from Madagascar. In describing these two species Moore (1906:151) perceptively noted that they were unlike their African congeners, but that they "bear a treacherous resemblance to each other, being as regards foliage virtually indistinguishable."

Leaves of *Mendoncia cowanii* var. *cowanii* vary from membranaceous (e.g., *Malcomber 2119*, *Randriamboavonjy et al. 838*) to conspicuously coriaceous (e.g., *Daniel et al. 10400*, *Razafindrabe et al. 157*). Irrespective of texture, leaves of this taxon frequently possess acarodomatia in axils of major veins on their abaxial surfaces. *Seigler 12818* is unusual in having fruiting pedicels up to 4 mm long and calyces to 7.7 mm long with one or more deep lobes (to 5.8 mm long).

Because flowers are most useful to adequately distinguish between *M. cowanii* and *M. decaryi*, specimens lacking them often cannot be identified with certainty (see under *M. decaryi* below for additional distinctions).

REPRESENTATIVE SPECIMENS EXAMINED.—MADAGASCAR. **Antananarivo:** Beanana (Fenoarivo), [ca. 18°23'S, 46°22'E], *Bosser 930* (P); Mandraka, P.K. 69, route d'Antananarivo à Toamasina, ca. 18°55'S, 47°56'E, *Dorr & Rakotozafy 2776* (MO); ca. 164 km W de Tsiroanomandidy, région de Bongolava, [18°52'19.77"S, 45°33'25.61"E], *Randriamboavonjy et al. 838* (CAS). **Antsiranana:** Réserve Naturelle Intégrale de Tsaratanana, Beangona, Fok. Ambinany Beangona, Fir. Marotolana, Fiv. Ambanja, 14°01'S, 048°47'E, *Antilahimena et al. 536* (BR, CAS, MO);

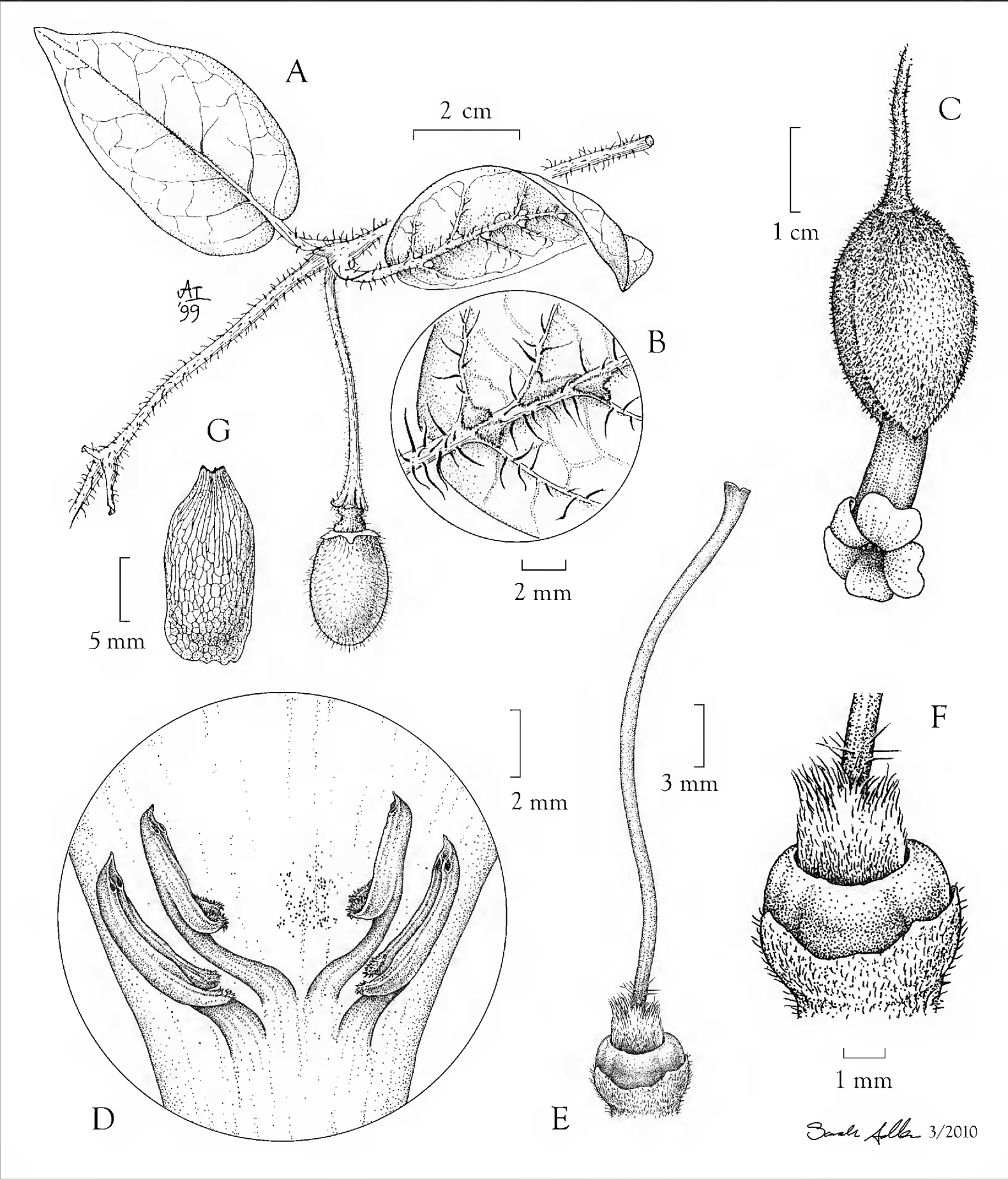


FIGURE 10. *Mendoncia cowanii* var. *cowanii* (A, B, G, Daniel et al. 9116; C–F, Daniel et al. 11000). A. Fertile node with a single dichasium in fruit. B. Portion of midvein and secondary veins, showing domatia, on abaxial surface of leaf. C. Flower partially encased by subtending bracteoles. D. Corolla tube split open to show androecium. E. Flower following dehiscence of corolla. F. Calyx, nectar disc, and pubescent ovary with style emerging. G. Seed. Drawn by Sarah Adler and Anya Illes.

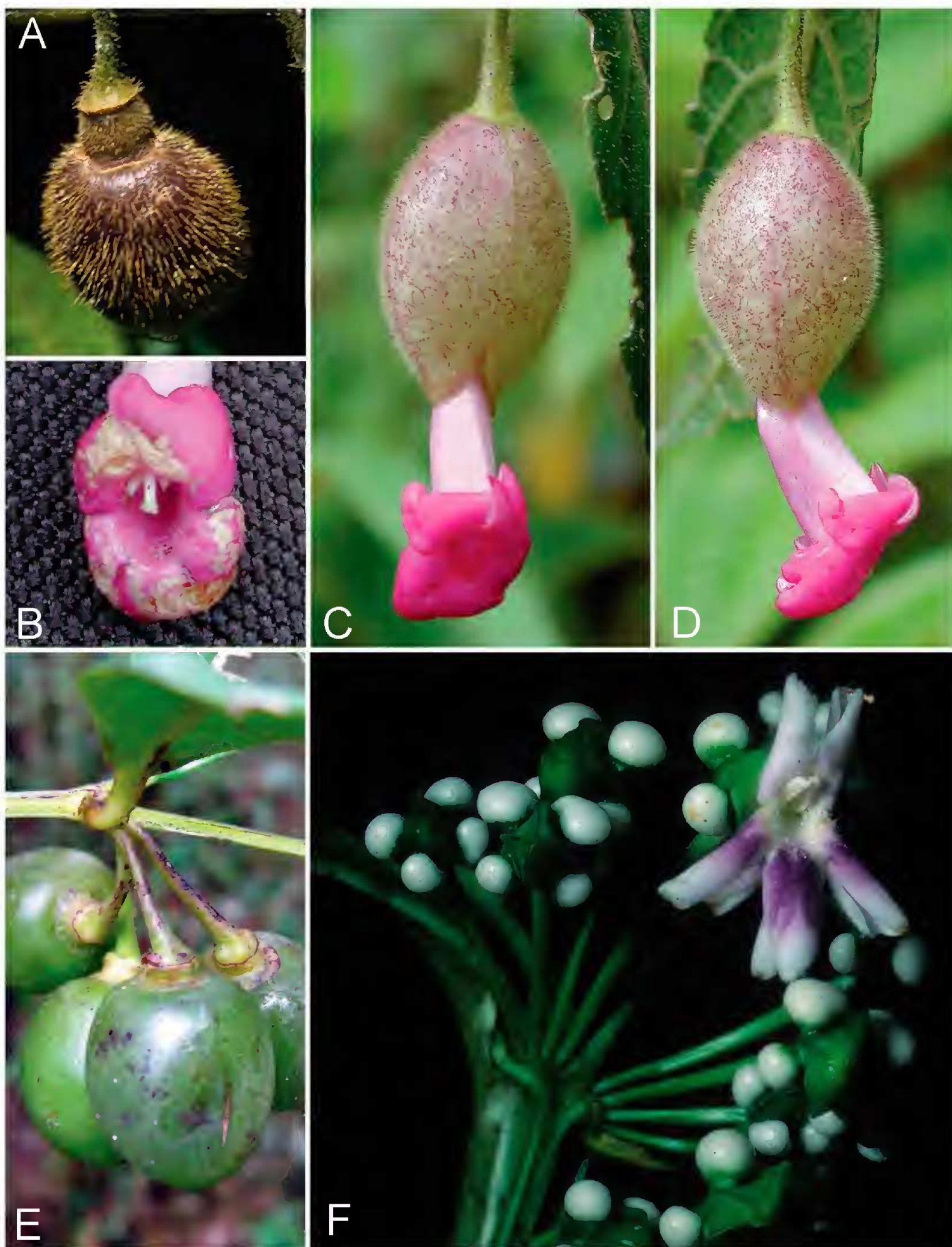


FIGURE 11. *Mendoncia cowanii* (A–D) and *M. flagellaris* (E, F). A. Mature drupe. B. Corolla limb showing discoloration due to insect visitation. C, D. Flowers with corolla tube encased by fluid-filled bracteoles. E. Immature drupes. F. Flower and bracteoles, each with a pair of prominent, white, and basal protuberances. (A–D, photos by T. Daniel of *Daniel et al.* 11000; E, photo [cropped] of *Razanatsima et al.* 422, copyright by Aina Razanatsima on Tropicos [www.tropicos.org/Image/100126998], CC by-NC-ND 3.0; F, photo by T. Daniel of *Daniel et al.* 9239).

Naturelle Marojejy, along trail to summit of Marojejy Est, NW of Mandena, 14°27'S, 049°47'E, *Miller* 3372 (MO); Réserve Naturelle de Marojejy; western slopes of Mt. Beondroka, 14°27'S, 49°47'E, *Miller & Randrianasolo* 4374 (MO); Réserve Naturelle de Marojejy; along the trail to the summit of Marojejy Est, N of Mandena, 14°26'S, 049°46'E, *Miller & Randrianasolo* 4576 (MO); environs d'Antalaha, [ca. 14°54'S, 50°16'30"E], *Perrier de la Bathie* 2169 (K, P); Montagne d'Ambre, partie sud, 12°41'03"S, 049°10'28"E, *Randimbiarison & Ramandimbimanana* 188 (CAS); Marojejy RN1, Sambava, ca. 10 km à vol d'oiseau de Maroambihy à 310° au NW, ca. 6 km à vol d'oiseau de Mandena à 318° NW, soit 13 km suivant la piste entre Mandena et le sommet de Marojejy, 14°26'30"S, 049°46'20"E, *Rasoavimbahoaka* 589 (MO); Marojejy RN1, Andapa, ca. 3.5 km à vol d'oiseau de Marovato (80°NE), et 2 km à vol d'oiseau de Sarahandrano (60° NE), soit 8 km environ à pied, 14°36'10"S, 49°39'50"E, *Rasoavimbahoaka* 647 (MO). **Fianarantsoa:** Ranomafana Natl. Park, Talatakely Trail System, downslope from the BT trail toward the Namorona River surrounding a small natural pond, 21°15'S, 047°15'E, *Almeda et al.* 8055 (CAS); Midongy du Sud, Beharena, 23°31'05"S, 047°05'34"E, *Andrianjafy* 1234 (MO); Ranomafana Natl. Park, Talatakely trail system S of Namorona River, 21°16'S, 047°25'E, *Daniel et al.* 9037 (CAS), *Daniel et al.* 9116 (CAS), 9255 (CAS), 11002 (CAS); 7 km W of Ranomafana, just S of Namorona river, Duke Primate Center study site, 21°16'S, 047°25'E, *Daniels* 98 (CAS, MO); Parc Natl. Ranomafana, Parcelle #3, Talatakely, piste vers Vohiparara, 21°15'S, 047°27'E, *Kotozafy* 139 (MO); PN 45 Parc Natl. Ranomafana, between Fianarantsoa and Ifanadiana, around cabine de reserche S of Namorona River, *Malcomber* 998 (MO); Ranomafana Natl. Park, Parcelle I, near village of Miaranony, Anosimasina, 21°09'S, 047°32'E, *Malcomber* 1589 (MO); Fivondronana Ivohibe, Firaiana Ivohibe, limite N de la Réserve Speciale d'Ivohibe le long de la rivière Ifefitany, 7.5 km ENE d'Ivohibe, campement 1, 22°28'12"S, 046°57'36"E, *Rakotovao et al.* 837 (MO); Haute Matsiatra, Ranomafana Natl. Park, Bevoahazo, 21°11'43"S, 047°28'55"E, *Ranarivelo et al.* 971 (CAS); Ranomafana Natl. Park, piste touristique de Vohiparara E du village de Vohiparara, direction NE piste B, Ifanadiana, 21°14'S, 047°23'E, *Ravololonanahary* 3 (MO); Ivohibe, Ivongo, Ambarongy, RN1 Andringitra, 22°13'S, 47°01'E, *Razafindrabe* 157 (MO); Réserve Speciale #7, Manombo, 37 km S of Farafangana, parcel W of RN12, 23°02'S, 047°42'E, *Schatz* 3188 (MO); near Ranomafana, near village of Ambodiamotana, *Seigler* 12818 (K, MO, P). **Toamasina:** Andasibe-Mantadia Natl. Park, Parc a Orchidées, 18°56'00.5"S, 048°24'51.9"E, *Almeda et al.* 9245 (CAS); route Moramanga à Anosibe, [ca. 18°54'6.29"S, 048°03'16.30"E], *Bosser & Millot* 6470 (P); Analamazaotra, [ca. 18°56'S, 48°26'E], *Capuron* 565-S.F. (K, P); Forêt d'Analamazaotra, *Capuron s.n.* (P); Andasibe, Analamazaotra (Perinet), *Cheek & Dransfield* B1383 (CAS); piste d'Ambatoharanana, massif du Rahobevava Bemaity, [ca. 18°00'S, 048°40'E], *Cours* 4152 (P); de Didy à Brickaville, *Cours* 4847 (P); 7 km N de Perinet vers Tamatave, *Cremers* 1482 (MO, P); forest reserve in vicinity of Perinet, along Route #2 between Tananarive and Tamatave, *Croat* 32280 (MO); Special Reserve Perinet-Analamozoatra in Andasibe (Perinet); *Daniel & Butterwick* 6721 (CAS); Parc Natl. de Mantadia, ca. 10 km N of Andasibe, trail to piscine along Andranomanaponga River (Rinasoa Trail), 18°49'30"S, 048°25'48"E, *Daniel et al.* 10400 (BR, CAS); Andasibe-Mantadia Natl. Park, Mantadia section, 14–19 km NE of RR station in Andasibe, 18°50'S, 048°26'E, *Daniel & Ranarivelo* 10539 (CAS, TAN), *Daniel et al.* 11000 (CAS, TAN); S de Moramanga, *Decary* 7005 (P); forêt S de Moramanga, [ca. 18°59'14.42"S, 048°15'12.73"E], *Decary* 7043 (P); Forêt de Sandrangato S de Moramanga, [ca. 19°06'30"S, 048°14'30"E], *Decary* 17755 (K, P), 17785 (K, P); environs de Andasibe-Perinet, 18°56'S, 048°25'E, *Dorr & Barnett* 3207 (MO); Analamazaotra, *Jardin Botanique Tana (TAN)* 2160 (P); Forêt d'Analamazaotra, *Keraudren-Aymonin & Aymonin* 25362 (P); Betampona Réserve Naturelle Integrale, 40 km NW of Toamasina, [ca. 17°54'46"S, 049°13'06.62"E], *Lewis & Razafimandimbison* 667 (MO); Andasibe-Perinet,

N of road from Antananarivo to Tamatave, 1 km along trail SW of old C.T.F.T. sawmill at Analamazotra, *Lowry & Schatz 4264* (CAS, MO); NE of Moramanga, at nickel mining exploration site, Ambatovy, plot 6 of Golder map, 18°51'34"S, 048°18'25"E, *McPherson 17517* (MO); Analamazotra, *Perrier de la Bathie 10265* (P); Forêt d'Andasibe, sur l'Onive, *Perrier de la Bathie 17048* (P); Betampona, Ambodiziena, W de Tamatave, *Perrier de la Bathie 17408* (P); Moramanga Distr., Andasibe, Forêt d'Analamazotra (Perinet), *Pettersson & Nilsson 253* (K); canton de Ambodiriana, district de Tamatave, *Rakotoniaina 5343-RN* (K, P); canton: Imerimandroso, district: Ambatondrazaka, *Rakotonao 10894RN* (P), *10895RN* (P); forestry station of Analamazotra, SE of the old road between Moramanga and Andasibe, 18°56'S, 048°26'E, *Randrianansolo 427* (MO). **Toliara:** along road through mountain in Chaines Anosyennes from Fort Dauphin (Taolagnaro) to Ranomafana, *Croat 31844* (MO); haute vallée de la Manampanihy [ca. 24°33'30"S, 047°04'30"E], entre le col de Saindro et Eminiminy, *Humbert 14023* (P); NW of Taolagnaro, Réserve Naturelle Intégrale #11 (Andohahela), parcelle I, NW of Eminiminy, beside River Itrotroky, 24°38'S, 46°46'E, *Malcomber 2119* (MO); Fort Dauphin (Taolagnaro), NW of town along road to Ranomafana, 24°46'S, 46°53'E, *McPherson & Rabevohitra 14970* (CAS, MO); Intégrale Réserve #11, Andohahela, Parcelle 1, SW of Eminiminy, Manatavona River, 24°40'S, 46°48'E, *Randramampoinona 599* (BR, MO). **Province not determined:** Madag. Centre, *Baron 289* (P); central Madagascar, *Baron 1448* (K, P); Madagascar, *Baron 2586* (K, P); central Madagascar, *Baron 3810* (P); north Madagascar, *Baron 6143* (K); without locality, *Homolle s.n.* (P); Cameaka, *Jardin Botanique Tana (TAN) 3689* (P); without locality, *Perrier de la Bathie 15968* (P).

2b. *Mendoncia cowanii* (S. Moore) Benoist **var. *coursii*** Benoist, *Notul. Syst. (Paris)* 11:141. 1944. **TYPE.**—MADAGASCAR. **Toamasina:** Ambatondrazaka, Sahalampy Onibé, [ca. 17°45'S, 048°51'E], Nov 1938, *Cours 1053* (holotype: P-00091099!; isotype: K-000393673!).

Young stems densely pubescent with yellowish to yellowish brown, interwoven, flexuose, unbranched, eglandular trichomes 0.2–2 mm long (velutinous), surface of stem not visible. Leaves subcoriaceous, petioles to 15 mm long, velutinous, blades ovate to elliptic to oblong-elliptic, 38–92.4 long, 18–47.3 mm wide, subcordate to rounded to acute at base, acute-apiculate to rounded to retuse at apex, abaxial surface pubescent like young stems but blade surface at least partially visible, adaxial surface pubescent with antrorse, eglandular trichomes 0.1–1 mm, trichomes on each surface usually denser on major veins. Inflorescences borne in leaf axils on young, mostly herbaceous and leafy stems, solitary or opposite at nodes, dichasia 1–2 per axil, peduncles to 50 mm long, velutinous. Bracteoles with color obscured by pubescence, persistent at least to immature stages of fruiting, ovate-elliptic to subcircular, 16.3–23.5 mm long, 10.2–21.4 mm wide, rounded to acute-apiculate at apex, rounded to truncate at base, abaxial surface velutinous, adaxial surface mealy-glandular. Calyx densely pubescent with mostly distally pointing, straight, eglandular trichomes to 3 mm long. Corolla purplish to pink, 30.5–38.7 mm long, externally glabrous, internally mealy-glandular, tube 28–33 mm long, limb 9–11.3 mm in diameter, upper lip 1.8–3.6 mm long with lobes rounded to emarginate, 1.8–3.2 mm long and 4–4.5 mm wide, lower lip 3–7.4 mm long with lobes rounded to emarginate 2.2–3.3 mm long and 3.4–3.5 mm wide. Stamens not seen. Style 27–29 mm long, glabrous, stigma subcapitate to subequally 2-lobed, lobes 0.1–0.3 mm long. Drupe (immature) ± ovoid, ca. 13 mm long, ca. 9 mm in diameter, densely pubescent with golden-brown, appressed eglandular trichomes 0.4–3 mm long.

PHENOLOGY.—Flowering May–September; fruiting October.

DISTRIBUTION AND HABITATS.—East-central Madagascar (Toamasina; EOO = 1,512 km²; Fig. 9). Plants occur in lowland to montane, primary, moist to wet, evergreen forests. Elev. 500–1040 m.

LOCAL NAME.—“Vahiboloina” (*Andrianjafy et al.* 186).

A full description of this variety is provided above because it is possible that these plants represent a species distinct from *M. cowanii*. It differs from the nominate variety primarily by the young stems, petioles, abaxial surface of leaf blades (Fig. 3A), peduncles, and bracteoles being densely pubescent with yellowish, interwoven, flexuose, unbranched, eglandular trichomes such that the underlying surfaces are not visible (or only partially so on the abaxial leaf blades). The variety occurs in a limited region of Toamasina Province in east-central Madagascar. Domatia are not evident on the abaxial surfaces of leaves, or, if present, they are likely obscured by the dense trichomes that are ubiquitous on that surface. Also in this variety, the overall length of the upper lip of the corolla and the length and width of lobes of the lower lip are shorter and narrower than in *M. cowanii* var. *cowanii*, but this may be attributed to lack of flowering material for comparison. Measurements of other characters and flowering times overlap between the two varieties. Additional fertile collections of plants conforming to this taxon should clarify its status as a variety of *M. cowanii* (as treated here), a more densely pubescent form of that species, or a distinct species.

ADDITIONAL SPECIMENS EXAMINED.—MADAGASCAR. **Toamasina:** Vavantenina, Commun de Miarinarivo, FKT Anamborano, Savaharina, PN Zahamena, à côté de la rivière Ihofika, limite de PN, 17°41'08"S, 048°59'43"E, *Rakotonandrasana* 485 (MO); Réserve Naturelle Intégrale Zahamena, forest of Amboditamena, 17°44'S, 049°00'E, *Malcomber* 2584 (MO); Parc Natl. de Zahamena, Rivière de Sahemora, 17°38'27"S, 048°52'32"E, *Andrianjafy* 186 (MO); PK 33, road Moramanga–Anosibe Anala, 19°10'56"S, 48°13'31"E, *de Block et al.* 922 (BR, K).

3. *Mendoncia decaryi* (Benoist) Magnaghi, *Novon* 23:188. 2014. *Mendoncia cowanii* Benoist var. *decaryi* Benoist, *Notul. Syst. (Paris)* 11:141. 1944. **TYPE.**—MADAGASCAR. **Toamasina:** Zahamena (Réserve Naturelle Intégrale 3), [ca. 17°38'30"S, 048°50'00"E], 23 Mar 1941, *Decary* 16712 (lectotype, designated by Magnaghi and Daniel, 2014: P-00091101!).

Young stems sparsely to densely pubescent with yellowish to golden-brown, erect to flexuose, unbranched, eglandular trichomes 1–3 mm long, and sometimes also with an understory of mostly erect, eglandular trichomes <0.05–0.3 mm long. Leaves membranaceous to subcoriaceous, petioles to 15 mm long, pubescent like young stems, blades ovate-elliptic to elliptic, 28–123 long, 24–77 mm wide, rounded to cordate at base, acuminate to acuminate-subcaudate (sometimes abruptly so) at apex, abaxial surface (primarily major veins) bearing flexuose, eglandular trichomes like those of young stems except to 4.2 mm long and often intertwined, and sometimes also with understory trichomes like those of young stems, and rarely with tufts of woolly trichomes in axils of main veins forming domatia (see discussion below), adaxial surface pubescent (usually denser on major veins) with antrorse, eglandular trichomes 0.6–3 mm long. Inflorescences borne in leaf axils on young, mostly herbaceous and leafy stems, solitary or opposite at nodes, dichasia 1–3 per axil, peduncles to 20 mm long, pubescent like young stems. Bracteoles purplish, persistent as fruit matures, elliptic to ovate-elliptic to ovate, 11–29.8 mm long, 9–18.4 mm wide, rounded at base, acute-apiculate to acuminate-subcaudate at apex, apicule or slender, tail-like apex to 6 mm long, abaxial surface densely pubescent with cauline type trichomes (except overstory trichomes to 3.5 mm long), adaxial surface mealy-glandular. Calyx densely pubescent with unbranched, eglandular trichomes 1–3 mm long. Corolla white with purplish markings, 33.5–49 mm long, externally glabrous to mealy-glandular, tube 20–32.5 mm long, limb 20.6–32.4 mm diameter, upper lip 13.5 mm long with rounded or emarginate lobes 8–10 mm long and 11.2–13.2 mm wide, lower lip 16.5–19 mm long with rounded or emarginate lobes 9.4–13.5 mm long and 12.2–15.2 mm wide.

Stamens 6.3–11 mm long, ventral pair inserted 3.8 mm distal to the dorsal pair, thecae 4.4–6.4 mm long, densely pubescent at base with a tuft of bristles 0.1–0.3 mm long, sometimes thecae of ventral stamens with bristles along entire length, connective extending 0.3–0.7 mm beyond thecae, extension of connective attenuate, glabrous, staminode (if present) not seen. Pollen not seen. Style 15.3–28 mm long, pubescent near base with eglandular trichomes to 1 mm long, glabrous distally, stigma subequally to unequally 2-lobed with lobes 0.2–0.5 mm long. Drupe subellipsoid to obovoid, 12.5–20 mm long, 6.5–17 mm in diameter, pubescent with golden-brown, unbranched, eglandular trichomes 0.1–1.5 mm long.

PHENOLOGY.— Flowering: February–April; fruiting: March–September.

DISTRIBUTION AND HABITATS.—Northern and east-central Madagascar (Antananarivo, Antsirana, Mahajanga, Toamasina; EOO = 105,283 km²; Fig. 12). Plants occur in primary, montane, moist to wet, evergreen forests. Elev. 300–1400 m.

ILLUSTRATION.— Magnaghi and Daniel (2014:189, Fig. 1).

LOCAL NAMES.— “Tsipolitrana” (Ratovoson *et al.* 273); “vahimpinaomby” (Razafitsalama *et al.* 473); “vahipisaka” (Rakotondrafara *et al.* 238).

USES.— Infusion of the stems used to treat syphilis (Razafitsalama *et al.* 473). Williams *et al.* (2006; as “*M. cowanii*”) reported the presence of two new bioactive molecules (cytotoxic naphthoquinones) in root and stem extracts of this species.

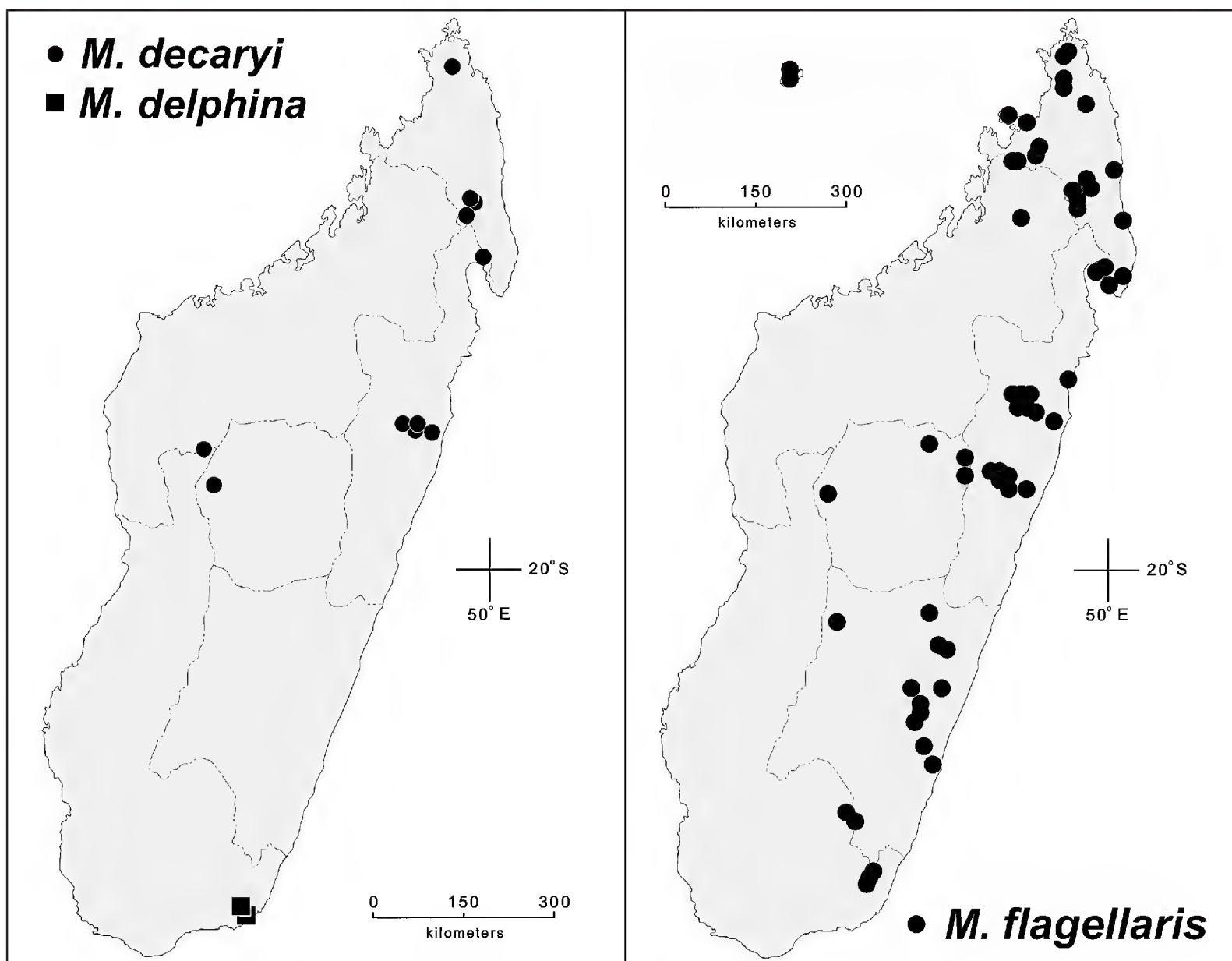


FIGURE 12. Map of Madagascar showing distributions of *Mendoncia decaryi* and *M. delphina*, and map of Madagascar and Mayotte showing distribution of *M. flagellaris*.

The major distinctions between *M. decaryi* and *M. cowanii* are color and sizes of components of the corolla, as indicated in the keys to species herein. Thus, identification of plants lacking corollas can be difficult. Some of the tendencies in characters that might help to distinguish these taxa include: leaves of *M. decaryi* are generally thinner, higher (4–5th) order veins more prominently protruding (or visible) on the abaxial leaf surfaces, prominent acarodomatia in axils of major veins on the abaxial leaf surface are entirely or usually absent (see below), and the apicule/narrowed, tail-like apex of the bracteoles is usually longer (up to 6 long mm vs. to 1 mm long in *M. cowanii*).

Two specimens, *Dorr 3538* and *Morat 4776*, lack adequate flowering material but possibly represent an undescribed taxon. They are included here because, like *M. decaryi*, they have stems, leaves, and bracteoles densely pubescent with golden-brown flexuose trichomes 1.3–3.5 mm long that sometimes overtop a shorter layer of dense trichomes (0.8–1 mm long) on the main veins of leaves and bracteoles. However, bracteoles on both of these specimens are smaller (10.3–10.8 mm long, 3.5 mm wide) than those of *M. decaryi*, and both have some domatia present on leaves (vs. absent in other collections of *M. decaryi*). *Dorr 3538* bears a single corolla with unmeasurable lobes. Label data indicate white petals with purple markings, as in *M. decaryi*. Both specimens were collected in west-central Madagascar (west of Tsiroanomandidy), well apart from other collections in wet forests of northern and eastern portions of the country. Study of additional material is needed to clarify the taxonomic status of these collections, which are here tentatively treated as *M. decaryi*.

ADDITIONAL SPECIMENS EXAMINED.—MADAGASCAR. **Antananarivo:** Bongolava W de Tsiroanomandidy, [18°49'00.012"S, 045°40'00.012"E], *Morat 4776* (P). **Antsiranana:** E Madagascar, N of Maroantsetra, ca. 8 km E of Sahavary, off the River Andranofotsy, *Du Puy & Du Puy MB 163* (K); Sous-préfecture d'Andapa, Commune Rurale de Doany, Fokontany de Betsomanga, versant NW du Marojejy, 0.2 km au N du camp I, 14°25'S, 049°36'E, *Gautier et al. 3798* (K, MO); Réserve Naturelle de Marojejy, N slopes of Ambatosoratra, 14°32'S, 049°41'E, *Miller 4202* (CAS, MO, TAN); Andranotsarabe, Befingotra, Bealampona, Andapa, 14°42'20"S, 49°32'00"E, *Rasoavimbahoaka & Rastefanonirina 287* (BR, MO, TAN); SW d'Andapa, Réserve Speciale d'Anjanaharibe-Sud, Ambodisatrana, aux environs des sommets, 14°32'45"S, 049°35'15"E, *Ravelonarivo 145* (MO). **Toamasina:** Réserve Naturelle no.3 (Zahamena), *Decary 16741* (P-00091100, K-000393674-photo); Betampona-Réserve Naturelle no.1, [17°55'S, 049°13'E], *Decary 16924* (P, TAN-000438-photo); Ampitanonoka à Fotsialanana, near Lac Alaotra, *Herbier de la Station Agricole de L. Alaotra 2441* (MO); W of Vavatenina, Réserve Naturelle Intégrale Zahamena, forest of Amboditamena, 17°44'S, 49°00'E, *Malcomber et al. 2516* (MO, TAN); Sous-préfecture Vavatenina, Commune Miarinarivo, Fokontany Anamborano, limite entre Vavatenina et Toamasina II, a 500 m d'Ifasina, 17°44'42"S, 048°58'26"E, *Rakotondrafara et al. 238* (MO); RNI Tamatave, *Rakotoniana 2875* (P); Parc Natl. de Zahamena, Andranofantsona, Manakambahiny I, Ambodimangavalo, 17°39'07"S, 048°58'14"E, *Ratovoson et al. 273* (MO); Fiv. Vavatenina, Com. Ambodimangavalo, secteur 2, aux environs (hors) du Parc Azhamena, forêt Ambinanin Antsahabesahona, vers 16 km SE d'Ambarifotsy, au bord du rivièrè Ihofika, 17°39'16"S, 048°, 58'50"E, *Razafitsalama 473* (MO). **Mahajanga:** 9.6 km NW of Ambohitaratelo-Bebao (NW of Tsiroanomandidy), [ca. 18°18'8.54"S, 045°32'18.84"E], *Dorr 3538* (MO, TAN).

4. *Mendoncia delphina* Magnaghi, Novon 23:190. 2014. TYPE.—MADAGASCAR. **Toliara:** NW of Taolagnaro (Ft. Dauphin), Parc Natl. Andohahela, Réserve intégrale no. 11, parcel 1, E boundary, 24°45'S, 46°51'E, 250–500 m, 17–20 Oct 1992, *Malcomber et al. 1665* (holotype: MO-05003406!; isotypes: K, TAN).

Young stems glabrous to mealy-glandular or sometimes pubescent with sparse, whitish to yellowish, antrorsely appressed, unbranched, eglandular trichomes 0.05–0.5 mm long. Leaves subcoriaceous, petioles to 14 mm long, glabrous or pubescent like young stems, blades elliptic to ovate-elliptic, 44–83 mm long, 15–34 mm wide, acute to cuneate at base, caudate (with tail-like extension to 12 mm long) to acuminate at apex, surfaces glabrous to mealy-glandular. Inflorescence borne in leaf axils on young, mostly herbaceous, and leafy stems, solitary or opposite at nodes, dichasia 1–2 per axil, peduncles to 40 mm long, glabrous or pubescent like young stems. Bracteoles yellowish, deciduous by time of fruit maturation, ovate to elliptic, 6.9–14 mm long, 5.3–8.3 mm wide, rounded to truncate at base, acute at apex, abaxial surface glabrous or with a few short trichomes to 0.3 mm long, adaxial surface mealy glandular and very densely but minutely (trichomes < 0.05 mm long) pubescent at apical tip. Calyx glabrous or sparsely pubescent with unbranched eglandular trichomes 0.05 mm long (sometimes restricted to margin). Corolla (purplish) white with purple throat, 16.1–18.5 mm long, externally and internally mealy-glandular, tube 7.6–9.3 mm long, limb 14–18 mm in diameter, upper lip 7.2–9.1 mm long with rounded lobes 5.3–6.6 mm long and 4.5–5.8 mm wide, lower lip 8.5–9.5 mm long with rounded lobes 5–8.5 mm long and 3.5–5.7 mm wide. Stamens 8.5–8.8 mm long, ventral pair inserted 0.5 mm distal to the dorsal pair, filaments mealy-glandular proximally, thecae 4–4.3 mm long, densely pubescent at base with a tuft of bristles 0.1–0.2 mm long, these sometimes extending distally on thecae, connective extending 0.6–1 mm beyond thecae, extension of connective attenuate, glabrous, staminode 2 mm long. Pollen 5-colpate, $E = 36\text{--}37\ \mu\text{m}$, $P = 35\text{--}37\ \mu\text{m}$, $P:E = 0.968\text{--}1.00$, $C = 8.7\text{--}10.6\ \mu\text{m}$, $C:P = 0.248\text{--}0.302$, rugulae microverrucate to microgemmate. Style 11–12.3 mm long, glabrous, stigma subequally to unequally 2-lobed, lobes 0.1–0.8 mm long. Drupe (immature ?) ovoid-ellipsoid, 13.5 mm long and 9 mm diameter, glabrous to mealy-glandular.

PHENOLOGY.— Flowering: October–November; fruiting: November.

DISTRIBUTION AND HABITATS.— Extreme southeastern Madagascar (Toliara; EOO = 134 km²; Fig. 12). Plants occur in lowland, moist to wet, evergreen forests near Taolagnaro. Elev. 250–500 meters.

ILLUSTRATION.— Magnaghi and Daniel (2014:192, Fig. 2).

Corollas of *Mendoncia delphina* resemble those of *M. flagellaris* in color (white with purple markings on the limb and throat), and its flowering period concurs with that species. The distribution of *M. delphina* overlaps those of both *M. cowanii* and *M. flagellaris*, but appears to be restricted to the southeastern-most Madagascar. The leaves of *M. delphina* are consistently elliptic with an acuminate apex and a unique venation pattern with the secondary veins branching from the midvein at angles of 35 to 45 degrees. A fruiting collection of *M. flagellaris* (Ravelonarivo & Rabesonina 741) from Antsiranana in northern Madagascar has leaves similar to those of *M. delphina* in both of these attributes. The identity of this collection, which lacks flowers, remains uncertain.

ADDITIONAL SPECIMENS EXAMINED.— MADAGASCAR. **Toliara:** Préfecture de Fort Dauphin, Forêt Manantantely, [ca. 24°59'S, 046°55'E], Dumetz 1395 (MO); NW of Taolagnaro (Fort Dauphin), RNI #11 (Andohahela), parcel 1, eastern boundary, [ca. 24°42'S, 46°44'E], Malcomber *et al.* 1665 (MO).

5. *Mendoncia flagellaris* (Baker) Benoist, *Bull. Mus. Hist. Nat. (Paris)*. 31:387. 1925. *Monachochlamys flagellaris* Baker, *J. Linn. Soc., Bot.* 20:217. 1883 (“1884”). **TYPE.**— MADAGASCAR. **Province unknown:** Central Madagascar, Oct 1882 (fide specimen at K), *Baron 1743* (syntypes: K-000393667-photo!, P-00091104!); *Baron 1789* (syntypes: K-000393668-photo!, P-00091103!).

Mendoncia madagascariensis Radlk., *Abh. Naturwiss. Vereins Bremen* 8:467. 1884. *Monachochlamys madagascariensis* (Radlk.) Baill., *Bull. Mens. Soc. Linn. Paris* 2:826. 1890 (as “*madagascarica*”). **TYPE**.—MADAGASCAR. **Antananarivo**: Ost-Imerina, Andrangolaoka [as “Andrangolóaka,” ca. 19°02'15.26"S, 047°54'57.70"E], Nov 1880, *Hildebrandt* 3693 (syntypes: HBG-517341-photo!, JE-00003605-photo!, JE-00003606-photo!, JE-00003607-photo!, K-000393669-photo!, K-000393671-photo!, M-0186545-photo!, M-0186546-photo!, P-00493833!, WU-035583-photo!).

Monachochlamys boivinii Baill., *Bull. Mens. Soc. Linn. Paris* 2:826. 1890. **TYPE**.—MADAGASCAR. **Antsiranana**: Nossi-be, cratère d'Ampombilava [13°23'35.06"S, 048°14'48.74"E], 1850 (fide specimen), *Boivin s.n.* (holotype: P-00493802!)

Young stems glabrous (at least internodes) to mealy-glandular to sparsely (to densely) pubescent with antrorse to antrorsely appressed, straw-colored, unbranched, eglandular trichomes 0.1–0.5 mm long (or rarely densely pubescent with erect to flexuose to recurved trichomes to 1 mm long, i.e., pilose), nodes sparsely to densely pubescent with stiff, straw-colored, mostly appressed, eglandular, unbranched trichomes to 1 mm long (sometimes deciduous on older stems). Leaves membranaceous to coriaceous, petioles to 27 mm long, glabrous to pubescent with erect to flexuose trichomes like those at nodes (or pilose), blades ovate to narrowly elliptic to broadly elliptic to subcircular to oblong to obovate to obcordate, 14–137 mm long, 7–102 mm wide, truncate to rounded to cuneate at base, acuminate to acute to rounded to truncate to retuse and often apiculate (with apiculum to 1.6 mm long) at apex, abaxial surface glabrous to sparsely pubescent with antrorse to antrorsely appressed trichomes 0.1–0.5 mm long (or pilose), adaxial surface glabrous to mealy-glandular and occasionally with eglandular trichomes like those of abaxial surface (or pilose), foliar trichomes sometimes restricted to major veins. Inflorescences borne in leaf axils on young, mostly herbaceous, and leafy stems, solitary or opposite at nodes, consisting of axillary, pedunculate dichasia or of a pedunculate, bracteate raceme bearing pedunculate dichasia in axils of bracts, dichasia 1–4 (–8) per axil, peduncles to 40 (–55) mm long, glabrous to sparsely pubescent like young stems, racemes (when present) to 15 cm long, rachis pubescent like young stems, bracts of racemes subfoliose and reduced in size acropetally, 2–40 mm long, 0.8–14 mm wide. Bracteoles green to greenish white, mostly deciduous in fruit, ovate to elliptic to oblong to obovate, 4.3–11.2 mm long, 2.5–10 mm wide, rounded to cuneate to subtruncate at base, rounded to acute to acute-apiculate to subacuminate at apex, abaxial surface glabrous to mealy-glandular or sparsely to densely pubescent with straw-colored, unbranched, mostly antrorsely appressed, eglandular trichomes to 0.5 mm long (or pilose), basally often beset with a conspicuous pair of whitish, gall-like, bulbous protuberances up to 2.5 mm high and 1.5–3 mm in diameter, adaxial surface mealy-glandular or ± densely beset with larger, sessile glands, distal margin and apex of adaxial surface inconspicuously but densely pubescent with flexuose, eglandular trichomes to 0.3 mm long. Calyx glabrous to mealy-glandular (or sometimes with a fringe of trichomes 0.1–0.2 mm long, e.g., *Baron* 3749). Corolla white to white with purple markings near base of lower lip, 8–15 (–18) mm long, externally glabrous to mealy-glandular, internally glabrous to mealy-glandular (especially in throat near mouth), tube (3–) 5–12.7 mm long, limb 4.5–29.1 mm in diameter, upper lip 2–12.5 mm long with rounded to emarginate lobes 1.4–11.6 mm long and 1.3–11.1 mm wide, lower lip 2.3–16.7 mm long with rounded to emarginate lobes 1.7–14.5 mm long and 2.5–9 mm wide. Stamens 2.8–5.9 mm long, ventral pair inserted up to 1 mm distal to dorsal pair, thecae 1.1–4.4 mm long, pubescent at base with a tuft of bristles 0.1–0.2 mm long, these sometimes extending toward apex of thecae and thecae sometimes minutely glandular dorsally, connective not extending or extending up to 0.5 mm beyond thecae, extension of connective triangular to oblong, glabrous to minutely glandular, staminode (if present) 1.3–2 mm long, thecae (when present) up to 0.9 mm long. Pollen 4 (–5)-

colpate, $E = 25\text{--}32\ \mu\text{m}$, $P = 23\text{--}27\ \mu\text{m}$, $P:E = 0.812\text{--}0.979$, $C = 5.8\text{--}9.1$, $C:P = 0.224\text{--}0.362\ \mu\text{m}$, rugulae microverrucate to microgemmate. Style 3–8.8 mm long, glabrous, stigma subcapitate with undulating margin/rim to unequally 2-lobed. Drupe ovoid-ellipsoid to ellipsoid to spherical to obovoid, 9.5–20 mm long, 6–15.7 mm diameter, glabrous to mealy-glandular. $n = 19$ (Daniel 2006).

PHENOLOGY.— Flowering: October–March; fruiting: year-round especially during July–March.

DISTRIBUTION AND HABITATS.— Throughout northern and eastern Madagascar (Antsiranana, Fianarantsoa, Toamasina, Toliara) and known from a few localities in central and west-central portions of the island (Antananarivo, Fianarantsoa, Mahajunga); also on Mayotte in the Comoros Archipelago (EOO = 458,376 km²; Fig. 12). Plants occur in lowland and montane, primary and secondary, moist to wet, evergreen forests; degraded secondary forests; gallery forests; dry deciduous forests; and coastal forests. Elev. 5–2000 m.

ILLUSTRATIONS.— Baker (1883:t. 26); Benoist (1967:5, Fig. 1); Figs. 11E, F and 13.

LOCAL NAMES.— “Mbarahanjelinala” (*Razafitsalama et al.* 136); “vahimbarongy” (*Kotozafy et al.* 372); “vahivarongy” (*Kotozafy* 125).

Morphological variation within and among the many collections of *M. flagellaris* is apparent in size, shape, texture, and pubescence of leaf blades; bracteolar size, shape, and protuberance presence/absence; inflorescence development (dichasia in leaf axils vs. dichasia borne in axils of bracts on elongate racemes from leaf axils); and drupe size and shape. *Dorr et al.* 3697 is atypical by having stems, leaves, peduncles, and abaxial surface of the bracteoles densely pubescent (pilose), as noted in the description above. Other collections (e.g., *van der Werff et al.* 12665) are somewhat intermediate between this collection and more typical ones by having more abundant trichomes, although shorter and antrorse to antrorsely appressed. The presence or absence of a pair of conspicuous, bulbous, and white protuberances on the basal portion of the abaxial surface of bracteoles is also variable. This feature, when present, is unique in the genus. Collections from throughout the geographic range of the species vary from having a pair of these on each immature and mature bracteole, having the protuberances when young but with the bracteoles becoming smooth at maturity, or having no protuberances on the immature or mature bracteoles. Some specimens show variation in this character on the same sheet. Several collections from northern Madagascar (e.g., *Andrianantoanina & Rocsceohclher* 259, *Andrianantoanina & Solotiana* 74, *Birkinshaw* 127, *Nicoll & Abraham* 679, *Rahajaso et al.* 202, *Schatz et al.* 1345) have conspicuously spherical drupes (in dried state). In other characters (including presence/absence of bulbous basal protuberances on bracteoles) these plants show variation like that in non-spherical-fruited specimens.

Rakotomalala & Narison 227 (14°05'S, 048°24'E; MO), from the Réserve Spéciale de Manongarivo in Antsiranana Province, appears similar to *M. flagellaris* in most characters, but differs in having dense, erect to flexuose trichomes to 2 mm long dispersed along the proximal third of the midvein on the abaxial leaf surface or forming domatia in the axils of the midvein and secondary veins. It is possible that all of these trichomes are associated with the domatia. This collection also has longer corollas (25 mm long) than otherwise observed in *M. flagellaris*, a pubescent calyx (with eglandular trichomes to 2 mm long), and a proximally pubescent style. The flower color (white with purplish markings) appears to conform to *M. flagellaris*. Although lacking flowers and the denser pubescence of *Rakotomalala & Narison* 227, *Gautier et al.* 3512 (13°59'S 48°26'E; K, MO) from the same region, is otherwise similar and has what appear to be incipient domatia in the vein axils. The disposition of these collections requires additional study, and they are not treated as pertaining to *M. flagellaris* here. Other collections from the region of the Manongarivo Reserve

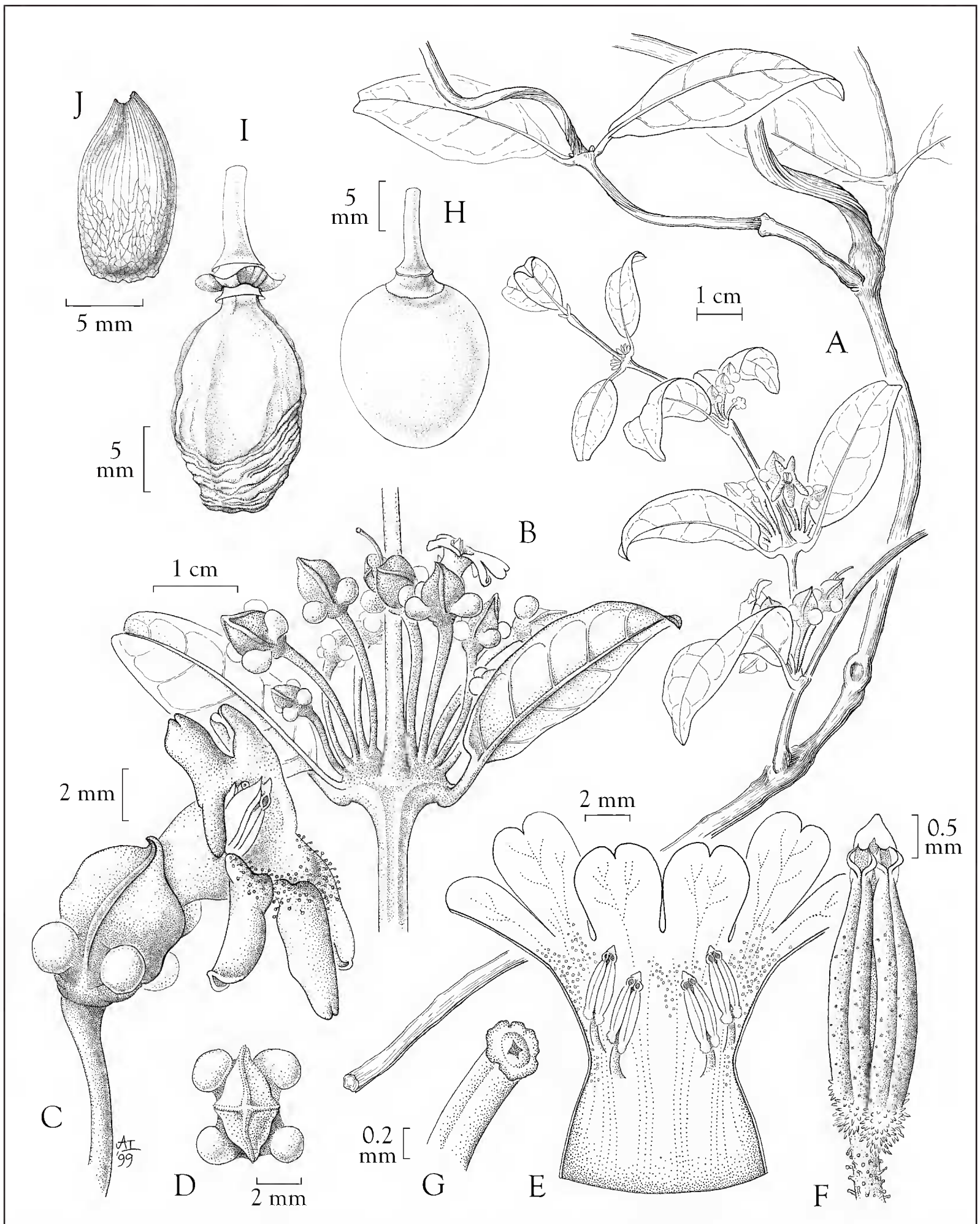


FIGURE 13. *Mendoncia flagellaris* (A–G, J, Daniel *et al.* 9239; H, I, Razanatsima *et al.* 422). A. Habit. B. Fertile node with multiple dichasia. C. Dichasium showing a flower and paired protuberances on bracteoles. D. Unopened bracteoles from above showing paired protuberances. E. Corolla split open to show androecium. F. Stamen showing two thecae bearing basal bristles, poricidal dehiscence, and extension of connective distal to pores. G. Apex of style and stigma. H. Fresh drupe (from photo) showing sequentially from top: distal portion of peduncle, calyx, and drupe. I. Dried drupe showing sequentially from top: distal portion of peduncle with flared apex, calyx with undulations, nectar disc, and drupe. J. Seed. Drawn by Jenny Speckels (A–G) and Becca Berezuk H–J.

(e.g., *McPherson & van der Werff 16410*, *Rakotomalala & Narison 103*) more closely conform to *M. flagellaris*, into which species they are placed here.

Two collections from Mt. Vato Vavy (21°24'S, 047°56'E) in eastern Fianarantsoa Province show similarities to *M. flagellaris* (e.g., white corollas with purplish markings), but appear to fall outside of the morphological variation of that species. Both collections represent fragments collected from the forest floor: *Daniel et al. 9291* (CAS) consists of dichasia from which the corollas have fallen, whereas *Daniel et al. 9295* (CAS), from a nearby site, consists of fallen corollas. Compared to *M. flagellaris*, the dichasia have mostly longer bracteoles (up to 16 mm long) and the corollas are larger in nearly all aspects (e.g., 24 to 34 mm long); thus both collections more closely resemble dichasia and corollas of *M. vinciflora*, which is currently known only from northern Madagascar. It remains unknown whether the corollas of the latter collection pertain to the dichasia of the former, and what characteristics the remainder of the plant(s) may have. Additional collections should resolve the identity or identities of these collections, which are not identified to species herein.

ADDITIONAL SPECIMENS EXAMINED.—MADAGASCAR. **Antananarivo:** Mandraka, *D'Alleizette 1067* (P); La Mandraka, R.N. 2, at p.k. 69, 18°55'S, 047°56'E, *Dorr et al. 3697* (MO); PK 64 entre Tananarive à Perinet, *Keraudren-Aymonin & Aymonin 25314* (P); Bongolava, W de Tsiroanomandidy, [ca. 18°52'16.55"S, 45°42'08.53"E], *Morat 4645* (P); Manankazo, NE de l'Ankazobe, [ca. 18°09'S, 047°14'E], *Perrier de la Bathie 10247* (MO, P); Forêt d'Andranomay, 13 km SE d'Anjozorobe et 2 km E d'Andranomay, 18°28'48"S, 047°57'18"E, *Ranaivojaona 88bis* (MO); Ambohidratrimo, without collector, 435 (P), *s.n.* (P). **Antsiranana:** S d'Antsiranana, près de Joffre-Ville dans le PN de Montagne d'Ambre, campement de Ben Freed, 12°27'S, 049°13'E, *Andrianantoanina & Rocsceohclher 259* (BR, MO), 280, (BR, MO); S d'Antsiranana, près de Joffre-Ville Parc Natl. de Montagne d'Ambre, campement de Chris, 12°35'S, 049°09'E, *Andrianantoanina & Rocsceohclher 309* (BR, MO); Montagne d'Ambre PN, 12°32'S, 049°07'E, *Andrianantoanina & Solotiana 74* (BR, CAS, MO); Montagne d'Ambre PN, 12°31'S, 049°09'E, *Andrianantoanina et al. 123* (CAS, MO); Nosy-Be, Réserve Intégrale de Lokobe, 13°24'35"S, 048°19'06"E, *Antilahimena 95* (MO); Réserve Naturelle Intégrale de Tsaratanana, following Ramena River, Fok. Antsahabe, Fiv. Ambanja, 13°51'50"S, 048°50'53"E, *Antilahimena 433* (MO); Diana, Nosy Be, Lokobe Reserve Integral, 13°24'37"S, 048°18'33"E, *Antilahimena & Devigny 250* (CAS); Sahaenjika, Ampanavoana, Antalaha, Parc Masoala, 15°41'33"S, 050°13'30"E, *Bernard et al. 154* (CAS, MO); Nossi Be, Lokobe RNI, 5 km SE of Hellville, 13°25'S, 048°18'E, *Birkinshaw 48* (MO), 111 (MO) 127 (MO); Ambatosoratra, [ca. 14°32'S, 049°42'E], *Cours 3327* (P); Anjanaharibe, *Cours 3719* (P); Sous-préfecture d'Andapa, commune rurale de Doany, Fokontany de Betsomanga, versant NW du Marojejy, camp I, 14°25'S, 049°36'E, *Gautier & Andriamparany 3887* (K, MO); R.N. du Marojejy, *Guillaumet 4110* (P); Province de Diego-Suarez des Roussettes au grand lac de la Montagne d'Ambre, *Homolle s.n.* (P); Ankarana, forêt d'Analamalitso, S d'Arivorano-Nord, *Humbert 19070* (P); pentes E du Massif de Marojejy (NE), W de la Rivière Manantenina, affluent de la Lokoho, *Humbert 22550* (P); contreforts W du Massif de Marojejy (nord-est), près du col de Doanyanala (limite des bassins de la Lokoho et de l'Andraronga), [ca. 14°19'S, 049°37'20"E], *Humbert 23153* (P); partie W du Massif de Marojejy (NE) de la callée de l'Ambatoharanana au bassin supérieur de l'Antsahaberoka, *Humbert 31415* (P); Massif de l'Anjanaharibe (pentes et sommet N), W d'Andapa (haute Andramonta, bassin de la Lokoho, NE), [ca. 14°36'S, 049°27'E], *Humbert et al. 24655* (BR, K, MO, P) route Andapa–Doany, vallée de l'Andranotsara, *Jacquemin H565J* (P); N of Andapa, Anjanaharibe-Sud Réserve Speciale, 14°46'48"S, 049°28'42"E, *Malcomber et al. 2675* (MO); WNW of Andapa, NW of village of Ambodisatrana, 14°32'S, 049°26'E, *McPherson 17167* (MO); Manongarivo Massif, above millage of Ambodisakoana, E of Ankaramy,

14°05'S, 48°20'E, *McPherson & van der Werff 16410* (MO); Réserve Naturelle de Marojejy, N slopes of Ambatosoratra, 14°32'S, 049°41'E, *Miller 4206* (MO); RNI Ankarana, 12°51'S, 049°05'E, *Nicoll & Abraham 679* (CAS, MO); (Massif), M'Tsaranana, [ca. 13°57'S, 048°52'E], *Perrier de la Bathie 2071* (P); M'Zaratanana (Massif Tsaratanana), *Perrier de la Bathie 15324* (P); Ambohitalana, Antalaha, [ca. 14°54'S, 050°16'30"E], *PN Madagascar 3382* (P); Sambava, *PN Madagascar (Sazy) 8837* (P); Réserve Speciale d'Ankarana, 12°55'S, 049°07'E, *Rahajaso et al. 202* (MO); Réserve Speciale de Manongarivo, E d'Ankaramibe, Bekolosy, 14°03'05"S, 048°17'07"E, *Rakotomalala & Narison 103* (MO); Fiv. Andapa, Fir. Ambodiangezoka, Fok. Antanambe, Forêt Betaolana, 8.5 km NW d'Ambodiangezoka, le long de la rivière Ambolokopatrika, Campement 1, 14°32.3'S, 049°26.3'E, *Rakotomalaza & Ravelonarivo 1907* (MO); Andapa, Marojejy NP, near piscine naturelle, 14°26'26"S, 49°46'44"E, *Rakotonasolo et al. 1870* (CAS); Forêt de Besanatribe, Ambanja, *Rakotozafy 331* (P); Adnapa, Marojejy Natl. Park, 14°26'S, 49°43'E, *Ranarivelo & Ravelonarivo 783* (CAS); Andapa, Marojejy, ca. 15 km from Manantenina village, 14°26'50"S, 49°45'37"E, *Randriamboavonjy et al. 899* (CAS); Fiv. Ambanja, Forêt Classée d'Ambato, 40 km N d'Ambanja, près du village de Bevoay, piste vers Ankify, 13°27'S, 048°32'E, *Randrianaivo et al. 257* (MO); Sous-préfecture de Vohemar, commune rurale de Daraina, forêt d'Antsahabe, 13°12.88'S, 049°31.83'E, *Ranirison & Nusbaumer 1116* (MO); Réserve Naturelle integrale 12, Marojejy, N d'Andapa, aux environs du sommet de l'Est, 14°29'S, 049°38'E, *Rasoavimbahoaka 15* (MO); Réserve Speciale d'Anjanaharibe-Sud, Andapa, 14°36'S to 14°49'S, 049°23'E to 049°32'E, *Rasoavimbahoaka & Ravelonarivo 203* (MO); Préfecture d'Antalaha, Sous-préfecture d'Andapa, commune rurale de Bealampona, SW d'Andapa, Réserve Speciale d'Anjanaharibe-Sud, village d'Andranotsarabe, suivant la route Nationale d'Andapa–Bealanana de la piste à W, Ambatomainty, camp No. 2, 14°44'42"W, 049°27'42"E, *Ravelonarivo & Rabesonina 477* (CAS, MO); Fiv. d'Andapa, Fir. de Bealampona, Fok. de Befingotra, Réserve Speciale Anjanaribe-Sud, environs 37 km SW de l'ancien village de Mandritsarhely, piste vers Ranomafana, *Ravelonarivo & Rabesonina 741* (MO); Fiv. d'Andapa, Réserve Special d'Anjanaharibe Sud, aux environs du sommet, 14°46'15"S, 049°29'E, *Ravelonarivo et al. 17* (MO); Préfecture d'Andapa, commune rurale de Bealampona, village de Mandritsarhely, Réserve Speciale d'Anjanaharibe-Sud, suivant la piste vers Ranomafana, 5.5 km SW de Befingotra, campement no. 1, 14°45'03"S, 049°30'03"E, *Ravelonarivo et al. 420* (MO); Tsaratanana RN1, Fok. Beangona, 8 km de Beangona, Antsahamanara, 14°02'50"S, 048°47'09"E, *Razakamalala et al. 36* (CAS, MO). **Fianarantsoa:** col de Sakavalana, [ca. 20°44'48.41"S, 046°04'32.54"E], *Alluaud s.n.* (P); ca. 5 km NW of the main entrance to Ranomafana NP on the road to Vohiparara, 21°14'43"S, 047°23'48"E, *Almeda 8031* (CAS); Iakora, Begogo, Bekora, forêt de Sahalava S du village de Androizaha, 23°32'09"S, 046°32'21"E, *Andrianjafy et al. 740* (MO); environs d'Ivohibe, *Armand s.n.* (P); forêt basse au PK298 (sud Ambositra), *Cremers 3639* (P); Ranomafana Natl. Park, along road and Namorona River near cascade overlook ca. 5 km NW of main park entrance toward Vohiparara parcel, 21°15'S, 047°24'E, *Daniel et al. 9131* (CAS); Ranomafana Natl. Park, trail from Vatoharanana research camp to Valo research camp, 21°18'S, 047°25'E, *Daniel et al. 9157* (CAS); Ranomafana Natl. Park, Talatakely trail system S of Namorona River, 21°16'S, 047°26'E, *Daniel et al. 9239* (CAS); Ranomafana Natl. Park, Vohiparara trail system N of Namorona River (ca. 1.5 km N of cascade overlook along Hwy. 25), *Daniel 9271* (CAS); Ranomafana Natl. Park, Vohiparara trail system N of Namorona River (ca. 1.5 km N of cascade overlook along Hwy. 25), 21°14'S, 047°23'E, *Daniel et al. 9276* (CAS); Vondrozo, P. de Farafangana, [ca. 22°49'S, 047°19'30"E], *Decary 5311* (P); Massif di l'Kongo–P. de Farafangana, *Decary 5691* (MO, P); Fort Carnot, Prov. de Farafangana, [ca. 21°51'30"S, 047°26'30"E], *Decary 5804* (P); Ranomafana Natl. Park, trail to Vatoharanana from Talatakely, 21°17'S, 047°25'E, *de Nevers 11373* (CAS); Ranomafana Natl. Park, trail

between Vatoharanana and Takatakely parcels, 21°15'S 047°27'E, *Fritsch 1554* (CAS); Ranomafana Natl. Park, along trail between Vatoharanana and Takatakely parcels, just N of A1250 m trail marker, 21°15'S, 047°27'E, *Fritsch 1556* (CAS); Bassin de la Matitanana, Cascade d'Ankitso, Forêt de Tsianovoha, *Heim s.n.* (P); Réserve Speciale de Pic d'Ivohibe, forest of Marovitsika, [22°31'30"S, 046°59'E], *Hoffmann et al. 218* (K); Chaîne du Vohibory (W d'Ivohibe), *Humbert 3126* (P); Pic d'Ivohibe (Bara), *Humbert 3309* (A, P, K, MO); haute vallée de la Rienana (bassin du Matitanana), *Humbert 3457* (K, P), 3564 (A, P); Akimba, near Ankerana, 30 km from Ambositra, E slope of watershed mountains, 20°37'S, 047°19'30"E, *Jongkind & Rapanarivo 908* (MO); 10 km S d'Ambalavao, *Keraudren-Aymonin & Aymonin 24621* (P); PN de Ranomafana, parcelle #3, Talatakely, piste AA, 21°15'S, 047°27'E, *Kotozafy 125* (BR, MO); PN de Ranomafana, parcelle #3, Vatoharanana, 21°15'S, 047°27'E, *Kotozafy & Randriamanantena 302* (MO); Parc Natl. de Ranomafana, aux environs de Vohiparara, 21°14'S, 047°23'E, *Kotozafy et al. 372* (BR, MO); Andringitra, Camp I, ca. 45 km S of Ambalavao, E bank of Iantara River, along Ambalamanenjana–Ambatomboay trail, edge of Andringitra Reserve, 22°13'20"S, 047°01'29"E, *Lewis et al. 759* (BR, MO); Andringitra, Camp III, ca. 40 km. S of Ambalavao, Andringitra Reserve, along tributary of Sahavatoy River, 22°13'22"S, 046°58'18"E, *Lewis et al. 944* (MO); between Fianarantsoa and Ifandiana, Route National 45, Parc Natl. Ranomafana, trail S from Cabine de Recherche to Vato camp, 21°15'S, 047°27'E, *Malcomber 1047* (MO); S of Farafangana, in Forêt Classée near Manombo Reserve, 23°03'16"S, 047°40'28"E, *McPherson & Rabenantoandro 18434* (CAS, MO); bord de l'Ihovika, bassin de Matitanana, *Perrier de la Bathie 10267* (P); Fiv. & Fir. Ivohibe, Réserve Speciale d'Ivohibe, 8 km E d'Ivohibe, 22°29'S, 046°58'06"E, *Rakotomalaza et al. 1447* (MO); Mahazony, Ambalavao, Ankotsobory, [ca. 22°13'30"S, 046°55'30"E], *Rakotonao 9178* (P); Sendrisoa, Ambalavao, [ca. 22°02'27"S, 047°00'34"E], *Rakotonao 9988* (P); Ivohibe, dans la RNI d'Andringitra, NO d'Ambarongy, SO du campement #3, 22°13'22"S, 046°58'18"E, *Rakotovao 270* (MO); Ivongo, Farafangana, Ankarenambe, *Rakotovao 613* (P); proche de Behazy-Sud Antomilaha, Farafangana, *Rakotovao 7485-RN* (P); Fiv. Ivohibe, Fir. Ivohibe, limite N de la Réserve Speciale d'Ivohibe le long de la rivière Ifefitany, 7.5 km ENE d'Ivohibe, Campement 1, 22°28'12"S, 046°57'36"E, *Rakotovao et al. 847* (MO); Ivohibe, Ivongo, Ambahatsy, RNI Andringitra, au 2e campement, forêt coupee par la riviere d'Iatara, 22°13'40"S, 047°00'13"E, *Razafindrabe et al. 98* (MO); Localité: R N V Canton: Antambohobe District: Ivohibe, *Razafindrakoko 3518-RN* (P); 7 km W of Ranomafana, on slopes above Namorona River, Duke Univ. Primate Center study site, 21°16'S, 047°25'E, *Schatz 2597* (MO); 7 km W of Ranomafana, just S of Namorona river, Duke Primate center study site, 21°16'S, 047°25'E, *Schatz & Miller 2444* (CAS, MO). **Mahajanga:** road from Antsohihy to Bealanana, 21–23 km E of Antsahabe, [ca. 14°44'7.95"S, 048°32'46.63"E], *Gentry 11738* (MO); Réserve Speciale d'Anjanaharibe-Sud, 11 km WSW Befingotra, 14°44'30"S, 049°26'30"E, *Lewis et al. 1309* (MO); Sous-préfecture de Befandriana-Nord, commune rurale de Matsoandakana, Quartier de Belalona, SW d'Andapa, Réserve Speciale Anjanaharibe-Sud, village d'Anjiamazava, suivant la route Nationale d'Andapa–Bealanana, piste vers le N approchant le sommet de Bevitsika, 14°42'S, 049°27'E, *Ravelonarivo & Rabesonina 558* (CAS, MO). **Toamasina:** Moramanga, Savoka, Ambodilongotra, village Coby André Daubercies, *Abraham 26779* (P); Phelps Dodge project site, ca. 15 air-km NE of Moramanga, ca. 11 km E of Antanambao, Ambatovy-South, 18°52'06"S, 048°18'23"E, *Andriatsiferana et al. 2162* (MO); PN de Masoala, sur la route d'Ambanizana à Analambolo (25 km N d'Ambanizana), ca. 6 km NE d'Ambanizana, Fiv. Maroantsetra, 15°34'07"S, 050°00'14"E, *Aridy et al. 44* (MO); 3 km ESE of Ankosy, on path from Ankosy to Antenina, 500 m from edge of RNI Zahamena, to 1000 m inside RNI, *Birkinshaw et al. 623* (MO); Ambohidavak'ely (D-43), District d'Ambatondrazaka, *Cours 515* (P); Moramanga, route d'Anjiro, *Cours 807* (P); District d'Ambatondrazaka, *Cours 953* (MO, P); Ambodimanga à

Antanambao, *Cours* 2787 (P), 2792 (P); de Didy à Brickaville, *Cours* 4832 (P), *Cours* 4844 (P), *Cours* 4874 (P); S de Moramanga, *Decary* 6988 (P), 6994 (P); Fanovana, [18°55'30"S, 048°32'E], *Decary* 17981 (K, MO, P); moyennevallée du Mangaro, *Decary* 18475 (P); Lac Alaotra-D43, [ca. 17°29'16.28"S, 048°34'2.81"E], *Jardin Botanique de Tana* 3901 (P); Soanierana–Antasibe, *Lam & Meeuse* 825 (P); bords de torrents entre Sandrangato et Anosibe (S de Moramanga), *Leandri* 1679 (K, MO, P); East Coast, Betampona Réserve Naturelle Intégrale, 40 km NW of Toamasina, [ca. 17°54'S, 049°13'E], *Lewis & Razafimandimbison* 688 (MO); Maroantsetra, trail E of village of Hiaraka, ESE of Maroantsetra, across bay, on NW coast of Masaola Peninsula, [15°29'S, 049°54'E], *Lowry et al.* 4045A (MO); Maroantsetra, Masoala Peninsula, Antalavia, ca. 22 km S of Ambanizana, along trail NE from “village” to Ampatra river, 15°46'S, 050°01'E, *Lowry* 4330A (CAS, MO); W of Vavatenina, Réserve Naturelle Intégrale Zahamena, forest of Amboditamenaka, 17°44'S, 049°00'E, *Malcomber et al.* 2518 (MO), 2575 (MO); NE of Moramanga, at nickel mining exploration site, Ambatovy, 18°51'25"S, 048°17'50"E, *McPherson* 17475 (MO); near Andasibe, forest of Mantadia, beyond graphite mine, 18°55'S, 048°25'E, *McPherson & van der Werff* 16472 (MO); near Andasibe, forest of Mantadia, beyond graphite mine, 18°55'S, 048°25'E, *McPherson & van der Werff* 16539 (MO); Forêt d'Analamazoatra, *Perrier de la Bathie* 10239 (P); Analamazoatra, *Perrier de la Bathie* 10242 (P); Riv. Anove–Coli Est, *Perrier de la Bathie* 10256 (P); Phelps Dodge project site, ca. 15 air-km NE of Moramanga, ca. 11 km E of Antanambao, Ambatovy, Antsahalava River east, 18°50'54"S, 048°17'56"E, *Rakotomalaza et al.* 1102 (MO); fiv. Vivatenina, commune: Ambodimangavalo, 10 km W d'Antevibe-Sahandrazana, adjacente du Parc Natl. de Zahamena, 17°32'S, 48°48'E, *Rakotonandrasana et al.* 714 (MO); Moramanga, commune: Ambohibary, fok.: Ampitambe, Ambatovy, NE de Moramanga, environ 22 km de Moramanga, 18°50'57"S, 048°17'18"E, *Rakotovao et al.* 1321 (MO); district: Moramanga, commune: Ambohibary, fokontany: Ampitambe, Ambotovy, 22 km NE de Moramanga, 18°51'21"S, 048°18'22"E, *Rakotovao et al.* 1407 (MO); Alaotra Mangoro, Moramanga, Andasibe, 18 km N from Andasibe, 18°48'49"S, 48°25'48"E, *Ranarivelo & Ranaivojaona* 322 (CAS); Maroanbehy, Tamatave, *Randriamahavita* 9064-RN (P); Parc Natl. de Zahamena, Antanandava, 2 km SW du village d'Ankossy, au sommet de la Forêt d'Ampangalambolosy, dans le parc, 17°29'38"S, 048°43'50"E, *Randrianasolo et al.* 130 (MO); district: Fenerive-Est. Tampolo Forestry Station, along the “Grand Layon,” ca. 1 km. from office, 17°17'S, 049°23'E, *Randrianasolo et al.* 605 (BR, CAS, MO); sous-préfecture: Vavatenina, commune: Ambodimangavalo, fokontany: Manakambahiny, Parc Natl. de Zahamena, 17°29'30"S, 048°54'32"E, *Randrianjanaka et al.* 652 (MO); Moramanga, Andasibe, Menalamba, entre Analamay et Ambatovy, 18°49'47"S, 048°18'41"E, *Razafindrabe et al.* 127 (MO); fivondronana: Vivatenina, commune: Ambodimangavalo, fokontany: Manakambahiny I. Andranofantsona 10 km S de Manakambahiny I, au bord du rivièrè Ihofika, 17°39'17"S, 048°49'10"E, *Razafitsalama et al.* 136 (MO); Vatomandry, Ambalabe, Ambinanindrano II, NE du Tobin'I Foara, 19°09'26"S, 048°34'47"E, *Razanatsima & Ranaivojaona* 36 (MO); Vatomandry, Ambalabe, Ambinaninandro II, E de Toby Foara, 19°09'46"S, 048°34'59"E, *Razanatsima et al.* 66 (MO); Alaotra Mangoro, Moramanga, Beforona, Forêt Ankeniheny, 19°07'50"S, 048°32'10"E, *Razanatsima et al.* 297 (MO); Alaotra Mangoro, Moramanga, Lakato, village Manasamena, forêt corridor Ankeniheny, *Razanatsima et al.* 422 (MO); Alaotra Mangoro, Moramanga, Lakato, village Manasamena, forêt corridor Ankeniheny, 19°04'34"S, 048°30'40"E, *Razanatsima et al.* 475 (MO); Nosy Mangabe, in the Bay of Antongil, 5 km S of Maroansetra, 15°30'S, 049°46'E, *Schatz & Carlson* 2920 (MO); Nosy Mangabe, 5 km from Maroansetra in Bay of Antongil, 15°30'S, 049°46'E, *Schatz & Gentry* 2177 (CAS, MO); Masoala Peninsula, just S of Ambanizana village, 15°36'S, 049°57'E, *Schatz et al.* 1345 (MO); Nosy Mangabe, 5 km from Maroansetra in the Bay of Antongil, 15°30'S, 49°46'E, *Schatz et al.* 2380 (MO); Perinet, Moramanga, *Service Forestier de Madagas-*

car 1214 (P); Analamazaotra, Perinet, *Service Forestier de Madagascar* 1414 (P); Analamazaotra, TAN 3746 (K, MO, P); Ranomafana, 19°06'S, 048°42'E, *van der Werff* 12665 (MO); near Andasibe, forest of Mantadia, beyond graphite mine, 18°55'S, 048°25'E, *van der Werff et al.* 13773 (MO); Masoala Peninsula, S of village of Ambanizana in Andranobe River watershed, 15°40'24"S, 049°57'51"E, *Vasey & Behasy* 388 (MO); Province d'Andovoranto, District de Moramanga, Forêt d'Analamazaotra, près du col d'Amboasary, *Viguier & Humbert* 984 (P). **Toliara:** Fort Dauphin, *Elliot* 2532 (P); Massif de Beampingaratra (SE), du col de Bevava au sommet de Bekoho, [ca. 24°26'S, 046°53'30"E], *Humbert* 6417 (P); bassin supérieur du Mandrare (sud-est), col et sommet de Marosoui, [24°32'S, 046°48'E], *Humbert* 6599 (P); Massif du Kalambatitra (centre-sud), Mont Beanjavidy, [23°22'S, 046°27'E], *Humbert* 12043 (P); Massif de l'Ivakoany (centre-sud), *Humbert* 12217 (P); Fort Dauphin, Eminiminy, RN #11 Andohahela, Camp 3, 13.5 km NW d'Eminiminy, 24°35'S, 046°44'E, *Rakotomalaza* 504 (MO). **Province undetermined:** Ankeramadinika, *Academie Malgache s.n.* (P); without locale, *Baron* 1345 (P), 1743 (P), 1789 (P), 2828 (K, P), 2877 (P), 3214 (P), 3580 (K, P), 5149 (P), *Chapelier s.n.* (P), *Commerson s.n.* (P), without collector 345 (P); central Madagascar, *Baron* 1463 (P), 2828 (K, P), 2920 (K, P), 3667 (K), 4196 (K, P); chiefly from NW Madagascar, *Baron* 3749 (K); forêt N de la route de Nickelville sur les bords Ankotrêano, *Cours* 2079 (MO, P); S de Mangabe, *Cours* 2505 (P); près Samalahaza, *Dequaire* 27869 (P), 27963 (P); central Madagascar, Andrangaloaka, *Parker s.n.* (K); route Antsirabe à Fianarantsoa, Forêt d'Ambasofiterahana, *Keraudren* 245 (P); Forêt de Fotsialanana, *Rakotozafy* 672 (P); Sahamalaza, Forêt de l'Est aux confins du pays Sihanaka, TAN 2827 (P). MAYOTTE (French island in Comoros Archipelago). **Grande Terre:** Combani, Bajoni, [ca. 12°47'39.06"S, 045°09'01.24"E], *Barthelat & Mchangama* 1738 (CAS, K); Dzomougne, Réserve Forestière d'Hachiroungou, [ca. 12°43'01.85"S, 045°06'16.05"E], *Barthelat et al.* 568 (CAS, MO, P); Accoua, Réserve Forestière d'Hachiroungou, [ca. 12°43'03.20"S, 045°03'54.22"E], *Barthelat et al.* 597 (MO).

6. *Mendoncia gilgiana* (Lindau) Benoist, *Bull. Soc. Bot. France*. 85:679. 1939 ("1938"). *Afromendoncia gilgiana* Lindau, *Bot. Jahrb. Syst.* 20:1. 1894. *Monachochlamys gilgiana* (Lindau) S. Moore, *J. Bot.* 67:227, in clavi. 1929. **TYPE.**— CAMEROON. **Southwest:** Urwald zwischen Barombi-ba-Mbu und Kake [ca. 04°37'51.92"N, 009°23'46.03"E], 4 Sep 1890, *Preuss* 481 (lectotype, designated here: K-000393683!; isolectotypes: BM. K-00393682!, P-00435324!).

Mendoncia gilgiana (Lindau) Benoist var. *tisserantii* Benoist, *Bull. Soc. Bot. France* 85:679. 1939 ("1938"). **TYPE.**— CENTRAL AFRICA REPUBLIC: **Ouaka:** région de la Oubangui, 20 km N de Bambari [ca. 05°56'0.74"N, 020°40'18.05"E], 10 Oct 1925, *Tisserant* 2055 (lectotype, designated here: P-00435316!).

Young stems pubescent (sometimes sparsely so) with yellowish or golden-brown, antrorse to antrorsely appressed or retrorse to retrorsely appressed, unbranched, eglandular trichomes 0.1–1 mm long, sometimes also with minute (i.e., < 0.05 mm in diameter), sessile glands and/or an overstory of flexuose to antrorse to recurved, yellowish or golden-brown, unbranched, eglandular trichomes 1.6–2.3 mm long, trichomes of internodes soon becoming sparse. Leaves subcoriaceous, petioles to 57 mm long, pubescent like young stems, blades ovate-elliptic to elliptic, 20–116 mm long, 8–63 mm wide, rounded to truncate to subcordate at base, acute-apiculate to subacuminate to acuminate-aristulate at apex, abaxial surface sparsely pubescent with scattered, erect to flexuose to antrorse to antrorsely appressed, golden-brown, unbranched, eglandular trichomes 0.2–1.5 mm long, trichomes sometimes concentrated on or restricted to major veins or only a few present on midrib near base of blade, adaxial surface glabrous or pubescent like abaxial surface. Inflorescences borne on young, leafy stems in axils of leaves, solitary or opposite at nodes, dichasia 1–5

per axil, peduncles to 25 mm long, sparsely pubescent like young stems. Bracteoles white to pale green (often tinged with pink or red) or purplish, mostly persistent in fruit, subcircular to elliptic to broadly ovate to lanceolate, 7.2–23 mm long, 3.6–16 mm wide, truncate to rounded to subcordate at base, acute to acuminate and sometimes apiculate at apex, apicule to 1 mm long, abaxial surface and margin mealy-glandular and usually pubescent (sometimes sparsely so) with an overstory of erect to flexuose trichomes similar those of overstory trichomes of young stems (except up to 3 mm long), adaxial surface glabrous to mealy-glandular. Calyx glabrous. Corolla white to purplish, 15.8–25.5 mm long, externally glabrous, internally with cluster of sessile, glandular trichomes in throat near stamen insertion, tube 9–20.4 mm long, limb 9–13.1 mm in diameter, upper lip 3.5–8.7 mm long with rounded lobes 2.8–5.3 mm long and 2.3–4.5 mm wide, lower lip 3.3–9.6 mm long with rounded lobes 2.3–7.4 mm long and 2.3–8.4 mm wide. Stamens 3.3–7 mm long, thecae 3.4–5 mm long, densely pubescent at base with a tuft of bristles 0.05–0.3 mm long and sometimes with sessile to subsessile glands dorsally, connective extending 0.4–1.1 mm beyond thecae, extension of connective attenuate, glabrous, staminode 0.8–1.5 mm long. Pollen 5-colpate, $E = 24\text{--}34\text{ }\mu\text{m}$, $P = 27\text{--}35\text{ }\mu\text{m}$, $P:E = 1.049\text{--}1.186$, $C = 5.6\text{--}8.5\text{ }\mu\text{m}$, $C:P = 0.169\text{--}0.242$, rugulae microverrucate to microgemmate to microbaculate. Style 6.5–20 mm long, glabrous or sometimes mealy-glandular near base, stigma subequally 2-lobed, lobes 0.1–0.4 mm long. Drupe \pm irregularly shaped, overall obovoid and widest at or just below apex, 6.8–11.8 mm long, 4.8–9.0 mm in diameter (at widest diameter near apex), apically truncate to abruptly and either symmetrically or asymmetrically acute, glabrous to mealy-glandular.

PHENOLOGY.— Flowering: all year with peak flowering during July–November; fruiting: July–April.

DISTRIBUTION AND HABITATS.— Widespread throughout tropical Africa (Cameroon, Central African Republic, Congo-Brazzaville, Congo-Kinshasa, Equatorial Guinea, Gabon, Ghana, Guinea, Ivory Coast, Kenya, Liberia, South Sudan, Tanzania, and Uganda; EOO = 4,487,300 km²; Fig. 14). Plants occur in lowland and montane, primary and secondary, moist to wet, evergreen forests; secondary bush; gallery forests; swamp forests; forest edges; roadside thickets; and in clearings. Elev. 100–1600 m.

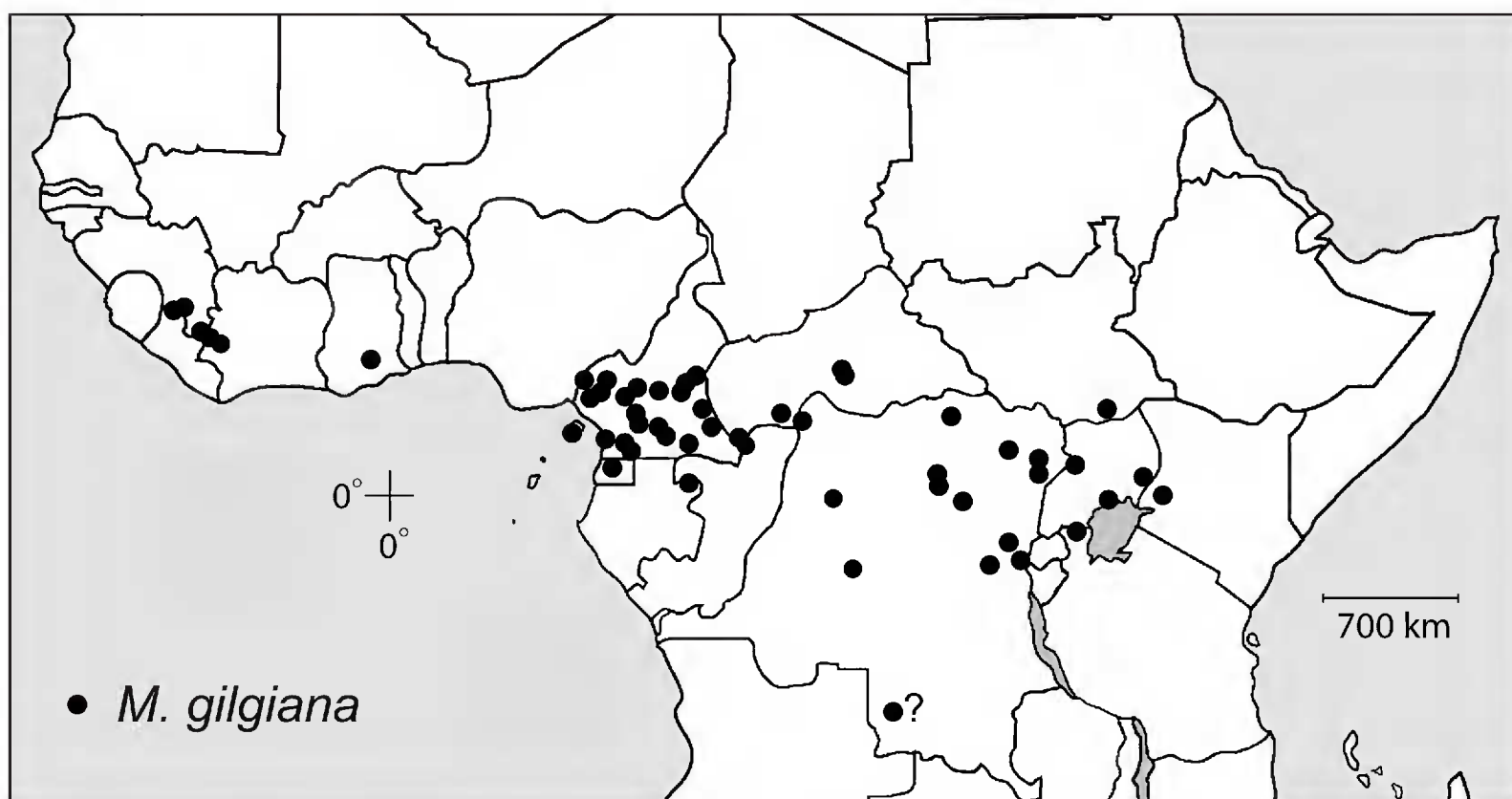


FIGURE 14. Map of central Africa showing distribution of *Mendoncia gilgiana* (see text for explanation of question mark).

ILLUSTRATIONS.—Lindau (1895:290, Fig. 115, D–M); Heine (1966:69, Pl. 14); Vollesen (2008:77, Fig. 12); Fig. 15.

In the progologue of *Mendoncia gilgiana* Lindau (1894) cited two collections (*Preuss* 481 from Cameroon and *Stuhlmann* 2690 from Congo-Kinshasa). The syntypes were presumably at B and are no longer extant. A lectotype is chosen from isosyntypes at K. Duplicates of *Stuhlmann* 2690 were not located during our studies. The lectotype of *M. gilgiana* var. *tisserantii* is chosen from the three syntypes, all studied by us, cited in the protologue (Benoist 1939): *Tisserant* 599, *Tisserant* 2055, and *Lebrun* 1613.

Bracteolar shape among specimens of *Mendoncia gilgiana* varies widely from subcircular to ovate-elliptic to broadly ovate to lanceolate. Pubescence is also variable in this species. For example, some collections (e.g., *de Wilde* 7888 and *Leeuwenberg* 6236, both from Cameroon) have both

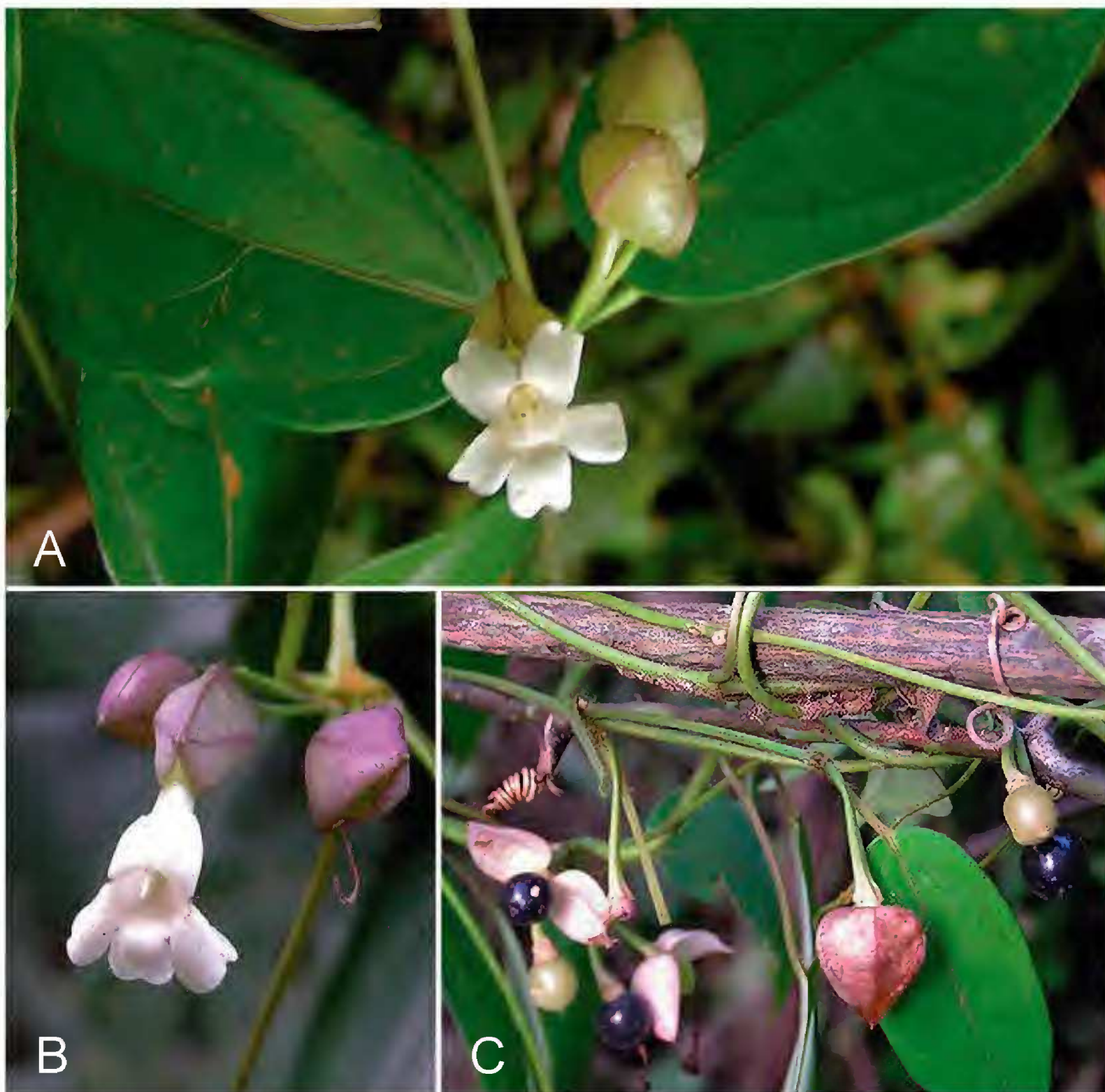


FIGURE 15. *Mendoncia gilgiana*. A. Node of young stem with open flower on one dichasium and greenish bracteoles. B. Flower and pinkish purple bracteoles. C. Mature drupes and spreading and deciduous bracteoles. (Photos by Jos Stevens from southeastern Congo-Kinshasa; African Plants-A Photo Guide: www.africanplants.senckenberg.de; non-commercial scientific and educational use; see text for additional information).

the overstory and understory trichomes on young stems, peduncles, and bracteoles, whereas others (e.g., *Adam* 29700 and 29644, both from Liberia) have only the sparse understory trichomes on young stems and peduncles and glabrous bracteoles. In *Aké Assi* 5424 from Ivory Coast, the young stems, peduncles, and bracteoles all bear only the understory type trichomes. Benoist (1939) distinguished *M. gilgiana* var. *tisserantii* from the nominate variety by its stems, petioles, and bracteoles being sparsely pilose. A few years later, however, he only mentioned *M. gilgiana* (Benoist, 1944). After studying this species throughout its range, this variety was not accepted as distinct by Heine (1966). Pubescence varies widely throughout the range of the species, and we concur that recognition of var. *tisserantii* seems unwarranted.

Ndolo Ebika 906 from Congo-Brazzaville would appear to be the first record of *Mendoncia gilgiana* from that nation. Plants from southern Congo-Kinshasa (Katanga: vic. Ferme Randu, ca. 09°19'3.22"S, 022°55'55.18"E; Fig. 14), known to us only from photographs by Jos Stevens (Fig. 15), appear similar to *M. gilgiana*, but would seem to differ by the spherical ripe drupes. Because drupe shapes in the descriptions here are based on dried fruits, it is possible that the fresh fruits of *M. gilgiana* are or can be spherical. This occurrence, the southernmost known record of the genus in Africa, is tentatively treated as pertaining to *M. gilgiana*, included in the EOO, and is indicated on the map with a question mark. Collections of *Mendoncia* from this region are desirable to verify the identity of these plants.

ADDITIONAL SPECIMENS EXAMINED.—CAMEROON. **Central:** toward Nom in Ndokwanen, 19 km S of Ndikiniméki, [ca. 04°37'14.27"N, 010°52'43.92"E], *Asonganyi* 341 (P), 373 (P); 35 km SE of Yaoundé, S of village Mfoe, [ca. 03°38'52.89"N, 011°43'9.31"E], *Breteler* 1790 (P); 7 km NNW of Yaoundé, village Ngoya II, [ca. 3°55'34.94"N, 11°29'14.41"E], *Breteler* 1953 (A, K, P, UC); Nanga-Eboko, [04°40'11.88"N, 012°22'36.05"E], *Jacques-Felix* 4756 (P); Ngoro et Séréré (30 km NNE de Bafia), [ca. 04°51'40.17"N, 011°23'12.42"E], *Letouzey* 7915 (K, P); près N'Dokononoro, à 15 km SW de N'Dikinimeki, [04°38'37.42"N, 010°48'37.72"E], *Letouzey* 10888 (K). **East:** 14 km NE of Doumé, near road to Bertoua and Dimako, [ca. 04°20'49.89"N, 013°31'23.22"E], *Breteler* 767 (A, K, P); 43 km NW of Bertoua, along road from Mbang to Ebaka, [ca. 04°56'47.05"N, 013°29'34.52"E], *Breteler* 1383 (P); Yokadouma, near Catholic mission, [ca. 03°28'16.96"N, 015°4'27.19"E], *Breteler* 1496 (P); Bertoua, 15 km along road to Deng Deng, [ca. 04°42'5.11"N, 013°37'24.93"E], *Breteler* 1834 (K, P); Bétaré Oya [05°35'52.58"N, 014°04'58.78"E], *Jacques-Felix* 4574 (P); Dengdeng, [05°11'46.87"N, 013°31'33.11"E], *Jacques-Felix* 4666 (P), 4667 (P); 12 km N of Ndemba II = 32 km N of KM 29 of road Bertoua–Nanga Ebbko, [ca. 04°46'57.92"N, 013°22'9.68"E], *J. Leeuwenberg* 5960 (K, MO); near Momjépom, KM 21 of road Yokadouma–Moloundou, [ca. 03°21'59.02"N, 014°59'22.70"E], *Leeuwenberg* 6236 (K, MO, P); Bangue (KM 75 route Yokadouma–Moloundou), [02°55'44.46"N, 015°14'46.21"E], *Letouzey* 5112 (K, P); près Yabenot II, 30 km SSE de Ngoila (Axe Lomie–Souanke), [ca. 02°24'32.18"N, 014°04'59.27"E], *Letouzey* 12006 (P). **Littoral:** Ebone, Nkongsamba–Douala, KM 114, 004°52'N, 009°54'E, *Bamps* 1517 (K, P); Ebo Forest Research Station (proposed Natl. Park), New Masseng trail, *J. Osborne et al.* 166 (K). **South:** around Zoetele, 52 km SE Mbalmayo, [ca. 03°14'40.49"N, 011°51'55.62"E], *Asonganyi* 125 (P); Station du Cacaoyer de N'Koemvone, 02°49'N, 011°08'E, *de Wilde* 7519 (MO); hill roughly between N'Kolandom and N'Koemvone, 02°49'N, 011°09'E, *de Wilde* 7888 (K, MO, P); Dept. Dja et Lobo, Nkolembembe, 60 km SE of Akonolinga, 3°15'N, 012°31'E, *Dongmo & Nkongmeneck* 553 (MO); près Aveubé (25 km ENE de D'joum), [ca. 02°40'49.80"N, 012°54'13.83"E], *Letouzey* 8283 (K, P); Moyo–Nyaka (9 km SSE Ambam), [ca. 02°18'53.94"N, 011°17'59.97"E], *Raynal & Raynal* 10106 (P). **Southwest:** vicinity of Nyasoso, *Cable et al.* 2882 (K), 3246 (K); Kupe village, hunter's path from Kupe village to mountain top, running to S and parallel with Esense river, 04°47'N, 009°41'E, *Cheek* 7092 (K); Nyasoso, Mount

Kupe, Walter's Trail, 04°50'N, 009°42'E, *Cheek* 7487 (F, K, P); Mt. Kupe, Nyasoso, Max's trail to top of mountain, 04°49'N, 009°42'E, *Cheek & Ebwekoh* 5660 (K); Division Kupe-Muanenguba, Muambong, 04°58'N, 009°46'E, *Cheek et al.* 9366 (K); Mt. Kupe, Gazette-Nyasoso, Nyasoso-Bedume road, God-dat trail (opposite Ngusi road), 04°52'N, 009°41'E, *Etuge M. et al.* 2515 (K, MO); Mount Kupe, *Schoenenberger* 1 (K); Mount Kupe, SW slope, main trail to the top from Kupe village, 04°45'N, 009°41'E, *Schoenenberger* 51 (F, K, P); Division Kupe-Muanenguba, above Nyasoso on Mann's trail up Mt. Kupe, *Sidwell et al.* 384 (K); Korup Natl. Park between Ikenge and Esukutang, ca. 6 km W of Ikenge, ca. 05°17'N, 009°05'E, *Thomas et al.* 7603 (MO); Bakossi Mts., W of Bangem, 05°05'N, 009°42'E, *Thomas & Mcleod* 5280 (MO). **Province not determined:** Samnat (Dikel), et Messimni (confluent Mékié-Djérem), *Letouzey* 3602 (P). CENTRAL AFRICAN REPUBLIC. **Lobaye:** bord de la Lobé, 5 km NW de Boubatiki, [ca. 03°59'54.21"N, 017°49'38.56"E], *Badré* 55 (K, P); région de Mbaiki et Boukoko, [ca. 03°52'30.12"N, 017°57'30.75"E], *Tisserant* 118 (P). **Ouaka:** région de Bambari, Riv. Gbatemoze, 15 km NW de Bambari, [ca. 05°58'22.61"N, 020°36'23.67"E], *Tisserant* 599 (P); galerie Ruiss. aff. Yamwé, 20 km N Bambari, [ca. 05°59'55.98"N, 020°33'34.63"E], *Tisserant* 2055 (P). **Sangha-Mbare:** 45 km S of Lidjombo, E side of Sangha River, Ndakan study area, 02°21'N, 016°09'E, *Harris* 2576 (K, MO); Dzangha camp, 11 km NE of Bayanga, 02°57' N, 016°21' E, *Harris* 3523 (E-photo); 2 km W of Kongana camp, 02°47'N, 016°25'E, *Harris* 4070 (E-photo). CONGO-BRAZZAVILLE. **Sangha:** Bomassa, 02°12'38"N, 016°11'38"E, *Ndolo Ebika* 906 (E-photo). CONGO-KINSHASA. **Equator:** Sud-Ubangi, Libenge-Ubangi, [ca. 03°36'57.63"N, 018°37'59.24"E], *Lebrun* 1613 (F, P). **North-Kivu:** Manyema, Mutongo, Terr. Walikale, [01°21'00.61"S, 028°05'42.06"E], *Gutzwiller* 3314 (K, MO). **Orientale:** Bambesa, [ca. 03°26'31.83"N, 025°41'8.31"E], *Blomme* 143 (K); Yaliboto vers Yalibonga (Bengamisa), Yanonge, [ca. 00°34'08.45"N, 24°42'54.02"E], *Bolangi Bo'yanguma* 64 (P); Ituri Distr., Mongbwalu, N of Msisi village, 01°59.56'N, 030°00.29'E, *Bytebier et al.* 3293 (K); Bas-Uele, *Dewulf* 135 (CAS); terr. Monkoto, Iwama, [ca. 02°08'38.46"S, 021°34'01.12"E], *Evrard* 2830 (K); terr. Befale, Kikako, [ca. 00°16'20.68"N, 020°58'31.99"E], *Evrard* 3055 (K); Bambesa, [03°27'33.85"N, 25°42'09.68"E], *Gerard* 3286 (K), 4567 (MO); Irumu-Beni, KM 100, 01°27'N, 29°52'E], *Gille* 261 (F, P); Wamba-Uele, [ca. 02°08'01.69"N, 28°00'43.19"E], *Lebrun* 3281 (P); Haut-Zaire, 12 km E de Wanie-Rukula, [00°12'04.18"N, 25°35'40.19"E], *Lisowski* 15616 (K), 16153 (K); Ituri, Mont Hoyo, bord de la route forestiere menant vers le Poste Hoyo, [ca. 01°13'05.37"N, 29°48'48.74"E], *Lisowski* 41144 (K); Yangambi, KM 6 route de Ngazi, *Louis* 517 (FHO); Yalibwa, en Yangambi, [ca. 00°54'20.78"N, 024°28'53.65"E], *Louis* 1350 (CAS); Yangambi, reserve division cafeiers, *Louis* 5700 (K, P); Yangambi, [ca. 00°48'40.29"N, 024°32'19.70"E], *Louis* 7622 (K, MO-photo, P); Yambuya [ca. 01°15'45.47"N, 24°33'13.83"E], *Louis* 7735 (K, P). **South-Kivu:** Panzi, galerie de la Makita, *Cal-lens* 3436 (K); Terr. Kalehe, près vill. Makwe, KM 105 route Kavumu-Walikale, [01°56'6.98"S, 028°27'57.96"E], *Christiaensen* 1847 (MO); Muhaki Terr. Shabunda, [ca. 02°43'29.14"S, 027°20'54.96"E], *Leonard* 3937 (CAS). **Province not determined:** Semlike, *Kassner* 3102 (P). EQUATORIAL GUINEA. **Bioko Sur:** between Musola and Concepción, [ca. 03°24'48.92"N, 008°41'49.84"E], *Wrigley & Melville* 549 (K). **Centro Sur:** KM 90-91, Bata-Niefang-Monte Alen, proximo a Niefang-Evinayong, [ca. 01°34'27.22"N, 010°22'25.58"E], *Carvalho* 5376 (MO). GABON. **Ogooue-Ivindo:** Mekambo, [ca. 01°00'34.82"N, 013°57'07.65"E], *Hallé* 2595 (P). GHANA. **Eastern:** Atewa Range F.R., [ca. 06°08'31.24"N, 00°36'26.58"W], *Hall & Enti* 39461 (K). GUINEA. **Macenta:** Mts. Ziamá, path from Sérédou to large antenna on Mt. Papo, [08°22'32.30"N, 009°19'34.63"W], *Burgt* 1290 (K). IVORY COAST. **Dix-Huit Montagnes:** entre Danané et N'Zo, [07°07'30"N, 007°46'17"W], *Aké Assi* 5424 (G); Nimpleu, près du Mont Momy [07°27'4.12"N, 008°04'43.59"W], *Aké Assi* 7047 (P). **District not determined:** frontière Guinée-

Côte d'Ivoire, *Nozerou s.n.* (P). KENYA. **Vihiga**: Yala River Forest, side opposite Nature Reserve, near Quarry Hill, [ca. 00° 00'11.40.67"N, 034°52'58.04"E], *Gilbert 6886* (K). LIBERIA. **Lofa**: Nekabozu District, Voinjama, [ca. 08°22'21.21"N, 009°44'14.46"W], *Baldwin 9971* (K). **Nimba**: Yéképa, forêt frontière Guinée, [ca. 07°34'08.39"N, 08°30'40.52"W], *Adam 29644* (MO); Yéképa, Gangra Road, *Adam 29700* (MO). SOUTH SUDAN. **Eastern Equatoria**: Talanga, Imatong Mountains, 04°01'N, 32°45'E, *Friis & Vollesen 494* (K). TANZANIA. **Kagera**: Bukoba Distr., Minziro Forest Reserve, 01°05'S, 031°32'E, *Bidgood et al. 4858* (CAS, K); Bukoba Rural Distr., Minziro Village, Nyakabanga, near Kagera River, 01°03'09"S, 031°35'59"E, *Festo et al. 266* (K, MO); Bukoba Rural Distr., Minziro Forest Reserve, SW of Minziri village toward Mtukula, 01°02'33"S, 031°29'47"E, *Festo et al. 1292* (K, MO); Bukoba Rural Distr., Minziro Forest Reserve, 01°01'06"S, 031°37'06"E, *Simon & Bayona 364* (K, MO). UGANDA. **Central**: Entebbe, [ca. 00°05'59.73"N, 032°28'07.20"E], *Brown 314* (K); Wakiso Distr., Kajansi Forest, mile 10 Entebbe Rd., [ca. 00°12'13.91"N, 032°33'02.57"E], *Chandler 1898* (K, P); Mengo Distr., ca. 5 mi SW of Mpigi, Mpanga Forest Reserve, [ca. 00°12'16.93"N, 032°18'30.07"E], *Drummond & Hemsley 4745* (K). **Eastern**: Bugisu Distr., Namatale L.F.R., [ca. 01°06'14.69"N, 034°25'07.00"E], *Philip 927* (K); **Western**: Busingiro, Budongo, *Harris 143* (K); Bulisa Distr., Budongo Forest, [ca. 01°47'36.98"N, 031°35'38.77"E], *Loveridge 106* (A, K, MO-photo); Masindi Distr., Siba Forest, [ca. 01°41'49.74"N, 31°27'12.42"E], *Sangster 15* (K); Bunyoro Distr., Bujenje Co., Budongo Forest, [ca. 01°47'46.52"N, 031°34'55.61"E], *Synnott 601* (K). **Region not determined**: Forest (Makia?), Mubango?, *Drummer 5586* (K); without locality, *Scott 7331* (K).

7. *Mendoncia kely* Magnaghi, *Novon* 23:191. 2014. **TYPE**.—MADAGASCAR. **Antsir-anana**: contreforts occidentaux du massif de Marojejy (NE) près du col de Doanyanala (limite des bassins de la Lokoho et de l'Andraronga), N d'Andapa, [ca. 14°32'47"S, 049°40'6"E], 800–1200 m, 25 Jan–25 Feb 1949, *Humbert 23067* (holotype: P-00493688!; isotypes: K!, MO!).

Young stems evenly and densely pubescent with yellowish to golden-brown, retrorse to flexuous to erect, unbranched, eglandular trichomes 0.1–1 mm long. Leaves subcoriaceous, petioles to 18 mm long, pubescent like young stems, blades subdeltate to ovate to elliptic to subcircular, 26–75 mm long, 18–45 mm wide, truncate to rounded to subcordate at base, (retuse to) acute to acuminate to abruptly acuminate at apex, abaxial surface mealy-glandular and pubescent like young stems, except trichomes to 1.5 mm long and often denser on major veins, adaxial surface more sparsely (often denser on major veins) pubescent with mostly antrorse trichomes to 1 mm long, trichomes often with a prominently pustulate base. Inflorescences borne in leaf axils on young, mostly herbaceous, and leafy stems, solitary or opposite at nodes, dichasia 1–5 per axil, peduncles to 30 mm long, pubescent like young stems, except trichomes mostly erect to flexuose and up to 1.5 mm long. Bracteoles green to greenish-white, deciduous in fruit, (ovate-elliptic to) elliptic to subcircular, (4–) 6.2–15.6 mm long, 3–13 mm wide, rounded at base, rounded to rounded- (to truncate-) apiculate (to subacuminate) at apex, apicule 0.1–0.3 mm long, abaxial surface densely pubescent with yellowish to golden-brown, erect to flexuose, unbranched, eglandular trichomes to 1.7 mm long and mealy-glandular, adaxial surface mealy-glandular. Calyx densely pubescent with erect to flexuous, yellowish to golden-brown, unbranched, eglandular trichomes to 1 mm long. Corolla pink at base, white at apex, and otherwise white with purple markings or purple with white markings, 13.2–19 mm long, externally glabrous to mealy-glandular, internally glabrous to mealy-glandular (prominently so at and proximal to region of insertion of stamens) and with a patch of stipitate glandular trichomes to 0.5 mm long at base of lower lip and in throat, tube 10–14 mm long, limb 9.3–16.4 mm in diameter, upper lip 4.7–8 mm long with rounded lobes 3.6–6.5 mm long and

3–6 mm wide, lower lip 6.5–9 mm long with rounded lobes 3.5–7.2 mm long and 4.4–8 mm wide. Stamens 4–5 mm long, ventral pair inserted 0.8–1 mm distal to dorsal pair, filaments (and adjacent corolla tube) mealy-glandular, thecae 3.3–3.5 mm long, pubescent at base with a tuft of bristles 0.1–0.3 mm long, these extending towards apex of thecae, connective extending 0.2 mm beyond thecae, extension of connective triangular, glabrous, staminode not seen. Pollen 5- or 6-colpate [?], $E = 27\ \mu\text{m}$, $P = 28\ \mu\text{m}$, $P:E = 1.03$, $C = 7.8\text{--}8.7\ \mu\text{m}$, $C:P = 0.283\text{--}0.314$, rugulae smooth. Style 9–9.8 mm long, glabrous, stigma asymmetrically subcapitate to subequally 2-lobed, lobes 0.2–0.4 mm long. Drupe ovoid-ellipsoid to ellipsoid to oblong to obovoid, 8.4–13.2 mm long, 7.1–10.5 mm in diameter, pubescent with erect to flexuose, eglandular, unbranched trichomes 0.3–1 mm long and mealy-glandular.

PHENOLOGY.— Flowering: January–February; fruiting: July–November.

DISTRIBUTION AND HABITATS.— Northeastern and southeastern Madagascar (Antsiranana, Toliara; EOO = 67,478 km²; Fig 16). Plants occur in lowland and montane, wet, evergreen forests. Elev. 250–1200 m.

Most collections of *Mendoncia kely* have been determined previously as *M. cowanii*. It differs from that species by its shorter corollas with shorter tubes, leaf blades that lack domatia on the abaxial surface, shorter stamens and style, and smooth rugulae of pollen exine. Additionally, in most collections of *M. kely*, the leaf blades tend to be broadly ovate to elliptic (with length:width of 1.2–1.8 vs. length:width of 1.7–2.8 in *M. cowanii*) and short (up to ca. 6 cm long). In a few collections of this species (e.g., *Antilahimena et al.* 4587, *Rakotovao et al.* 2740) some or all blades are ovate (with length:width 2–2.3) and longer (up to 7.5 cm long).

ADDITIONAL SPECIMENS EXAMINED.— MADAGASCAR. **Antsiranana.** Roussettes SF, 12°31'S, 049°08'E, *Andrianantoanina & Bezana* 213 (BR, CAS, MO); Fivondronana Antsiranana II. Parc Natl. de Montagne d'Ambre, à environ 70 km SW d'Antsiranana par route, et 9 km W du village de Marovato Scama (Anivorano), campement Andasibe, 12°37'30"S, 049°11'43"E, *Andrianantoanina & Bezana* 777 (BR, CAS, MO); S d'Antsiranana, près de Joffreville, à la station Roussette, 12°27'S, 49°13'E, *Andrianantoanina & Rocsceohclher* 364 (BR, MO); près d'Antsalaka, Montagne d'Ambre PN, 12°27'S, 049°13'E, *Andrianantoanina et al.* 221 (BR, MO); Andapa, Anjialavabe, Ankiakabe, Tsaralanto, 14°13'59"S, 049°23'17"E, *Antilahimena et al.* 4587 (CAS); Montagne d'Ambre Natl. Park, SW of Ambohitra (Joffreville), ca. 12°30.5'S, 049°10'E, *Daniel & Butterwick* 6742 (CAS), *Daniel* 10591 et al. (CAS); WNW of Andapa, NW of village of Ambod-

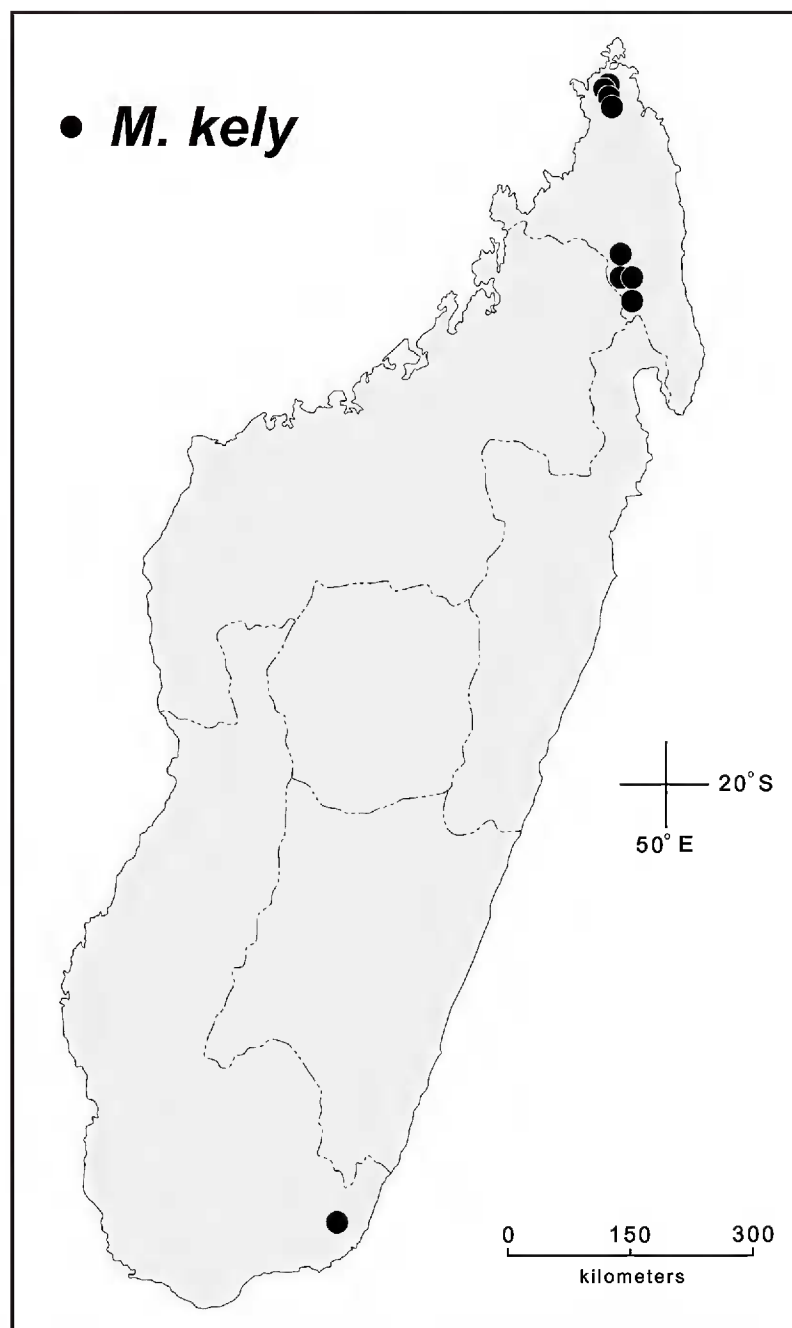


FIGURE 16. Map of Madagascar showing distribution of *Mendoncia kely*.

isatrana, 14°32'S, 049°26'E, *McPherson 17159* (MO); Sava, Andapa, Ambodivohitra, à 12 km SW de la commune rurale d'Anjialavabe et N d'Anjialavahely, 14°14'12"S, 049°23'05"E, *Rakotovao et al. 2740* (MO); Préfecture d'Antalaha, sous-préfecture d'Andapa, commune rurale de Bealampona, village de Mandritsarahely. SW d'Andapa, Réserve Speciale d'Anjanaharibe-Sud, suivant la piste vers Ranomafana, 5.5 km SW de Befingotra, campement #1, 14°45'03"S, 049°30'03"E, *Ravelonarivo et al. 451* (MO). **Toliara:** Andohahela RNI, Parcelle #1, beside Itrotroky river, NW of Eminiminy, Fort-Dauphin, 24°38'S, 046°46'E, *Andrianantoanina et al. 11* (BR, MO).

8. *Mendoncia lindaviana* (Gilg ex Lindau) Benoist, *Mem. Soc. Linn. Normandie*, n.s.i. 2:44. 1928. *Afromendoncia lindaviana* Gilg ex Lindau *Bot. Jahrb. Syst.* 17:112. 1893. *Monachochlamys lindaviana* (Gilg ex Lindau) S. Moore *J. Bot.* 67:226, in clavi. 1929. **TYPE.**— GABON. **Estuaire:** Sibange-Farm on the Gaboon, Dec 1880, *Soyaux 156* (lectotype, designated here: K-000393685!).

Lirayea floribunda Pierre, *Bull. Mus. Hist. Nat. (Paris)* 2:342. 1896. *Afromendoncia floribunda* (Pierre) Burkill, *Fl. Trop. Afr.* 5:6. 1899. *Monachochlamys floribunda* (Pierre) S. Moore, *J. Bot.* 67:226, in clavi. 1929. *Mendoncia floribunda* (Pierre) Benoist, *Notul. Syst. (Paris)* 11:143. 1944. **TYPE.**— GABON. **Estuaire:** prope Libreville, [ca. 00°27'44.20"N, 009°28'34.84"E], 1891, *Jolly 101* holotype: P-00435322!).

Afromendoncia klaineana Pierre ex Benoist, *Notul. Syst. (Paris)* 2:285. 1912, nomen nud.

Young stems glabrous to mealy-glandular, lacking elongate trichomes. Leaves coriaceous, petioles to 25 mm long, glabrous to mealy-glandular (rarely with antrorse, eglandular, unbranched trichomes to 2 mm long), blades ovate-elliptic to elliptic to lanceolate, 34–189 mm long, 11–80 mm wide, acute at base, (acute-apiculate to) subacuminate-aristate at apex, surfaces glabrous. Inflorescences (see discussion below) mostly borne on woody, peg-like short-shoots 2–10 mm long at leafless nodes of older, woody stems, short-shoots solitary or opposite at nodes, sometimes branched (branches appearing ± clustered or dendritic) in an axil and then to 20 mm long, dichasia 1–20 or more per axil at a time (but with peduncular scars on branched short-shoots revealing 100 or more dichasia present over time), peduncles purplish, to 42 mm long, glabrous. Bracteoles white to greenish white (often tinged with pink or purple) or pinkish or purplish, persistent as fruit matures and usually deciduous by maturity, ovate-elliptic to elliptic to subcircular to obovate, 6.6–16.7 mm long, 4.4–10 mm wide, acute- to acuminate-apiculate at apex, apicule 0.1–1.5 mm long, truncate to rounded at base, abaxial surface mealy-glandular (lacking elongate trichomes), adaxial surface mealy-glandular. Calyx mealy-glandular (sometimes mostly or exclusively so on or near marginal rim). Corolla white (sometimes pinkish at base), 13.5–24 mm long, externally ± mealy-glandular, internally mealy-glandular (especially on adaxial surface of lobes), tube 8.5–16.4 mm long, limb 7.2–18.3 mm in diameter, upper lip 2.8–8.4 mm long with rounded lobes 2.8–6.3 mm long and 2.2–6.5 mm wide, lower lip 5.7–11.2 mm long with lobes 2.9–7 mm long and 3.1–9 mm wide. Stamens 4.1–6.5 mm long, ventral pair inserted 1.2–1.6 mm distal to dorsal pair, thecae 2.2–4.6 mm long, pubescent at base with a tuft of bristles 0.1–0.2 mm long, these sometimes becoming sparse and extending toward apex, and also beset with mostly sessile glands on either dorsal or ventral surface, connective extending 0.2–0.5 mm beyond thecae, connective extension attenuate, sometimes with a cluster of sessile glands on dorsal surface at apex, staminode not seen. Pollen 6-colpate, E = 36 µm, P = 35 µm, P:E = 0.980, C = 7.8–8.2 µm; C:P = 0.223–0.236, rugulae sparsely microverrucate to microgemmate. Style 11.6–14 mm long, glabrous, stigma subequally to unequally 2-lobed, lobes 0.1–0.4 mm long. Drupe oblong, laterally compressed, 12.3–19.9 mm long, 6.5–14.5 mm in diameter, glabrous to ± mealy-glandular.

PHENOLOGY.— Flowering: August–June; fruiting: all year.



FIGURE 17. *Mendoncia lindaviana*. A. Older, woody shoot bearing dichasia with flowers and fruits at nodes. B. Flower. C. Dichasium with flower in background (showing relationship between style/stigma and anthers) and dichasium with corolla dehiscent in foreground (showing 2-lobed stigma). D. Node of woody shoot showing dichasia borne on peg-like stubs and bearing young fruits. (A, C, photos by Xander van der Burgt of *M'Boungou et al. MR 421* from Congo-Brazzaville, used with permission; B, photo by Benedict John Pollard from Congo-Brazzaville, used with permission; D, photo and copyright by Ehoarn Bidault of *Bidault 900bis* from Gabon, on Tropicos [www.tropicos.org/Image/100228305], CC by-NC-ND 3.0).

DISTRIBUTION AND HABITATS.— Tropical central Africa (Cameroon, Central African Republic, Congo-Brazzaville, Congo-Kinshasa, Gabon; EOO = 1,586,281 km²; Fig. 7). Plants occur in lowland to montane, primary and secondary, wet, evergreen forests; semi-deciduous forests; swamp forests; gallery forests; and clearings. Elev. 60–1000 m. *Mendoncia lindaviana* also likely occurs in the continental portion of Equatorial Guinea, which lies between known occurrences in Cameroon and Gabon, but has no specimens have been seen from there.

ILLUSTRATIONS.— Thiselton-Dyer (1896:t. 2426); Heine (1966:67, Pl. 13); Fig. 17.

LOCAL NAME.— “Amokisemekiseme” (Kibila; *Madidi* 332).

Heine (1966) indicated that the holotype of *Afromendoncia lindaviana* was destroyed at B, and that there was an isotype at P. We were unable to locate the isotype at P, but there is another one at K, which we designate as the lectotype for this name.

A mature inflorescence bearing a branched short-shoot in *Mendoncia lindaviana*, as described above, is shown in Figures 3F, 17D. Rarely, dichasia are borne on younger shoots with leaves present at the nodes (e.g., *Breteler & Jongkind 10386*, *Madidi 332*). In these younger inflorescences, the short-shoots are present but only two to three mm long. Such plants are recognizable as pertaining to *M. lindaviana* by their lack of trichomes on stems, leaf blades, and peduncles; the usually aristate leaf apices (Fig. 3B); and the consistently oblong drupes (Fig. 3D).

ADDITIONAL SPECIMENS EXAMINED.—CAMEROON. **Central:** Dja et Lobo, Koungoulou, 72 km SW of Akonolinga, *Nkongmeneck 1478* (K). **East:** Doumé, near Catholic mission, [ca. 04°14'34.60"N, 013°27'57.10"E], *Breteler 1858* (K, P); 27 km SW of Bertoua near Toungrélo village, *Breteler 2620* (K, P); Nkoue–Bertoua, *Letouzey 3051* (P); Ngondouma–Bertoua, *Letouzey 3102* (P); près des vallées du Dja et de l'Edjune–Abong-Mbang, [ca. 03°28'19.13"N, 013°22'41.29"E], *Letouzey 3806* (K, P); piste forestière Anpel-Mase–Abong-Mbang, *Letouzey 3994* (K, P); Matcheboum [04°06'39.58"N, 013°14'26.80"E] près Abong-Mbang, *Letouzey 4605* (K, P). **South:** colline Ongongo près Mbanga (km 81 route Kribi–Ebolowa, près Sous-préfecture Akom II), Nyabessan, *Letouzey 9484* (CAS, K, P); Bipinde [ca. 03°04'43.43"N, 010°24'58.48"E], *Zenker 194* (GH), 965 (K, P), 1801 (P), *s.n.* (P). **CENTRAL AFRICAN REPUBLIC.** **Sangha-Mbare:** Kongana, 25 km SE of Bayanga, 02°47'N, 016°25'E, *Harris 5029* (E-photo). **CONGO-BRAZZAVILLE.** **Kouilou:** Mayombe, near Niari River, 04°02'24.7"S, 012°09'52.4"E, *M'Boungou et al. MR 421* (MO); route Pounga–Dimonika, source "Paris Sangha," *Cusset 568* (P); environs de Dimonika, entre Tour Meteo et piste Kuilila–Makaba [ca. 04°08'3.44"S, 012°21'4.06"E], *Cusset 1193* (P); environs de Dimonika: versant E du Bamba, au-dessus de la Loubomo, *Cusset 1227* (P); Dimonika, *Moutsamboté 139* (P). **Lékoumou:** Mont Ndoumou, au niveau de village de Mandili, [ca. 03°22'9.19"S, 013°39'48.90"E], *Bouquet 1788* (P). **Department not determined:** Mayombe, *Hallé 1523* (P). **CONGO-KINSHASA.** **Equator:** Station Inéac Boketa, Riviere Wolo, [ca. 03°10'11.05"N, 19°48'01.59"E], *Evrard 1027* (BR); Bomputu (Boende), [ca. 00°18'51.74"S, 020°31'10.59"E], *Evrard 3977* (BR, K); Befale–Tolongote, [ca. 00°33'56.88"N, 020°45'18.57"E], *Evrard 4163* (BR). **Orientale:** Bambesa, [03°27'33.85"N, 25°42'09.68"E], *Gerard 5537* (K); Terr. Isangi, Yabohondo, [ca. 00°44'22.47"N, 023°58'35.27"E], *Germain 8757* (K); Zone de Mambasa (Ituri), Epulu, 01°25'N, 028°35'E, *Hart 727* (BR, F), 925 (BR, F); Zone de Mambasa (Ituri Forest), Lenda [01°24'N, 028°34'E], *Kahimdo 87* (K, MO); Buta, [02°50'22.62"N, 024°44'9.04"E], *Lebrun 2539* (CAS); environs de Kisangani, le Kongole sur la Lindi, [ca. 00°34'11.07"N, 025°07'57.16"E], *Lisowski 52254* (K); Jambao, a 25 km au NW de Jangambi, [ca. 0°54'40.16"N, 24°21'16.10"E], *Louis 8974* (MO, P); Lèlanda W de Janojambi, [ca. 00°47'58.47"N, 024°22'57.64"E], *Louis 10825* (K); Territoire Mambasa (Ituri Forest), Lenda, 01°24'N, 28°34'E, *Madidi 332* (K, MO). **North-Kivu:** Territory Kalehe, route Kavumu–Walikale, Trougi, [ca. 01°51'57.98"S, 028°29'54.26"E], *Troupin 2502* (K). **South-Kivu:** Tubalaka, Tsunyakini/Bunyakiri, Terr. Kalihe, [ca. 02°05'30.37"S, 028°34'36.47"E], *Gutzwiller 1398* (BR). **GABON.** **Estuaire:** Akoga, Mts. de Cristal, *Hallé 878* (P); Libreville, *Klaine 700* (CAS, P); 22 km Kougeleu–Asak, [ca. 00°26'5.99"N, 010°02'20.70"E], *Leeuwenberg & Persoon 13599* (K, MO, P); about 7 km E. of M'Voum, 24 km NE of Ntoun, 0°33'N, 009°52'E, *Louis et al. 275* (MO); River Muni, Corisco Bay, *Mann 1849* (K, P); Monts de Cristal: Tchimbélé Dam region, 00°37'N, 010°24'E, *McPherson 17918* (MO). **Moyen-Ogooué:** Missanga, 5–15 km NW of Ndjolé, 00°05'S, 101°45'E, *Breteler & Jongkind 10386* (CAS, G). **Ngounié:** between Mouila and Yeno, about 34 km on road from Mouila, 01°45'S, 011°20'E, *Breteler et al. 8106* (K, MO, P); old forest along Waka river, about 1–2 km SW of Forestry exploitation Camp Waka situated about 32 km SW of Sindara (by road 65km), 01°14'S, 010°53'E, *Louis et al. 1368* (MO); "Haute Ngounyé," *Le Tetsu 5497* (P); 60 km on road Mouila to Yeno, 01°41.91'S, 011°24.09'E, *Wieringa et al. 4552* (K). **Nyaga:** région du Nyanga; Manzambi,

[ca. -3.146086455, 10.91076607], *Le Tetsu* 2104 (G, P). **Ogooué-Ivindo**: Belinga, Mines de Fer, [ca. 01°08'7.92"N, 13°12'07.74"E], *Aubreville et al.* 20 (P); Belinga, about 2 km. along the lower track of Babel Nord, *Breteler & de Wilde* 723 (MO, P); Station I.R.E.T. (M'Passa Field Station), 10 km S de Makokou sur la rivière Ivindo [00°30'38.58"N, 012°48'15.73"E], *Dorr & Barnett* 4241 (K, MO); Station d'Ipasa, 10 km S de Makokou, *Florence* 812 (P); M'Passa Field Station, near Makokou on Riviere l'Ivindo, transect 17, *Gentry* 33450 (MO); Makokou, [00°33'35.78"N, 12°53'17.72"E], *Hallé* 1078 (P); 6 km NE de Mékambo, [ca. 01°01'12.92"N, 013°59'28.88"E], *Hallé* 2599 (K, P); 15 km SW Makokou, CNRS Mission Biologique, [ca. 00°27'51.58"N, 012°45'33.04"E], *Hallé* 2655 (K, P); Belinga, *Hallé* 3005 (P), 3041 (P), 3240 (P), 3393 (P); Ipesa, 10 km S de Makokou, Layon J vers 620, *Hladik* 2485 (P); Ipesa, Makokou, *Hladik s.n.* (P). **Ogooue-Lolo**: région de Lastoursville, [ca. 00°49'58.95"S, 012°40'21.68"], *Le Tetsu* 7675 (P). **Woleu-Ntem**: about 22 km NE of Asok, [ca. 00°51'2.58"N, 010°27'48.27"E], *Breteler & de Wilde* 234 (MO). **Province not determined**: région entre Ogooué et Cameroun, Bengò, *Le Tetsu* 9117 (P); Ogooué (river), *Leroy s.n.* (P). COUNTRY UNDETERMINED. **Without locale**: *Hladik* 1396 (P); "Nèuga," *Lana* 191 (BR).

9. *Mendoncia phytocrenoides* (Gilg ex Lindau) Benoist, *Mem. Soc. Linn. Normandie*, n.s.i. 2:44. 1928. *Afromendoncia phytocrenoides* Gilg ex Lindau, *Bot. Jahrb. Syst.* 17:112. 1893. *Thunbergia phytocrenoides* T. Anderson ex Lindau, *Bot. Jahrb. Syst.* 17:113. 1893, pro syn. *Monachochlamys phytocrenoides* (Gilg ex Lindau) S. Moore, *J. Bot.* 67:227, in clavi. 1929. **TYPE**.—GABON. **Estuaire**: Muni River, Lat. 1°N, Sep 1862, *Mann* 1839 (lectotype, designated here: K-000393679!; isoelectotypes: P-00435325!, K-000393681!, K-000393680-photo!, W-0006693-photo!, S-SG128-photo!).

Afromendoncia iodoides S. Moore, *Cat. Pl. Oban* 74. 1913. *Monachochlamys iodoides* (S. Moore) S. Moore, *J. Bot.* 67:227, in clavi. 1929. *Mendoncia iodoides* (S. Moore) Heine, *Kew Bull.* 16:180. 1962. *Mendoncia phytocrenoides* var. *iodoides* (S. Moore) Heine (as "iodoides"), *Fl. Gabon* 13:74. 1966. **TYPE**.—NIGERIA. **Cross River**: Oban [05°13'27.64"N, 008°33'18.53"E], 1911, *Talbot & Talbot* 388 (holotype: BM-000930925-photo!; isotype: K-000393684-photo!).

Mendoncia letestui Benoist, *Notul. Syst. (Paris)* 11:143. 1944. **TYPE**.—GABON: **Ogooue-Lolo**: région de Lastoursville, Moughounda [ca. 00°51'57.94"S, 012°46'57.20"E], 14 Aug 1930, *Le Testu* 8250 (lectotype, designated here: P-00435326-photo!; isoelectotypes: P-00435327!, BR-000000629448-photo!, BR-000000629442-photo!; K!; probable isoelectotype: IFAN-16076-photo!).

Young stems evenly and densely pubescent with an overstory of flexuose to recurved, golden-brown or straw-colored, unbranched trichomes 1.4–5 mm long and a sparse to dense understory (sometimes ± inconspicuous) of branched (stellate to dendritic) trichomes 0.2–0.4 mm long, older stems sparsely pubescent to glabrate. Leaves subcoriaceous, petioles to 46 mm long, pubescent like young stems, blades broadly ovate to subcircular to elliptic to obovate-elliptic, 86–200 mm long, 57–114 mm wide, rounded to subcordate at base, subacute to acute at apex, abaxial surface pubescent with erect to flexuose, unbranched trichomes 1.3–2.7 mm long (especially on main veins), these sometimes overtopping an understory (sometimes very sparse) of branched trichomes 0.2–0.4 mm long (and sometimes very sparse and inconspicuous erect, glandular trichomes 0.1 mm long, as well), adaxial surface glabrous to ± mealy or pubescent along proximal portion of midvein with trichomes like those of abaxial surface. Inflorescences borne on older, woody, mostly leafless stems, solitary or opposite at nodes, dichasia 1–3 (–5) per axil, peduncles to 30 mm long, pubescent like young stems. Bracteoles red to purplish (or brown when dry), mostly persistent in fruit,

subcircular to ovate to elliptic to lanceolate, 12–37.8 mm long, 6.5–23.4 mm wide, rounded at base, acute-apiculate at apex, apiculum (usually obscured by pubescence) 1–2.8 mm long, abaxial surface and margin pubescent with flexuose to antrorse, mostly unbranched, golden-brown trichomes 1.5–5.5 mm long, these overtopping an understory of branched trichomes 0.1–1 mm long, adaxial surface \pm mealy and sometimes with scattered trichomes to 1.5 mm long, major veins sometimes \pm protruding abaxially resulting in a channeled appearance. Calyx pubescent with branched trichomes (fide Schönenberger and Endress 1998). Corolla white, 29.3–31.8 mm long, externally glabrous, tube 23.4–24.9 (–30) mm long, apically ampliate, limb 9.3–14.6 mm in diameter, upper lip 4.4–4.9 mm long with emarginate lobes 2.7–4.2 mm long and 4–5.2 mm wide, lower lip 6.5–7 mm long with emarginate lobes 4.4–5.3 mm long and 3.5–5.9 mm wide. Stamens 8.7–24.8 mm long, ventral pair inserted 1–2 mm distal to dorsal pair, thecae 2.4 mm long, pubescent at base with a tuft of bristles 0.1–0.2 mm long, these and glandular trichomes sometimes extending down the filament, connective extending 2–3 mm beyond thecae, connective extension attenuate, pubescent with glandular and eglandular trichomes 0.05–1 mm long, staminode 0.5–1.3 mm long. Pollen 5-colpate, $E = 29\text{--}31\text{ }\mu\text{m}$, $P = 29\text{ }\mu\text{m}$, $P:E = 0.967\text{--}1.007$, $C = 6.8\text{--}8.6\text{ }\mu\text{m}$, $C:P = 0.234\text{--}0.295$, rugulae smooth to very sparsely microverrucate to microgemmate. Style 22.8–27 mm long, stigma subequally 2-lobed, lobes 0.1–0.4 mm long. Drupe ovoid to subspherical, 17.6–24.8 mm long, 12.2–15.3 mm in diameter, pubescent with erect, mostly unbranched (and with a few scattered, apically branched) trichomes 0.1–0.6 mm long.

PHENOLOGY.— Flowering: February–September; fruiting: all year.

DISTRIBUTION AND HABITATS.— Tropical central Africa (Cameroon, Congo-Kinshasa, Gabon, Nigeria; EOO = 689,906 km²; Fig. 18). Plants occur in wet, evergreen forests. Elev. 200–850 m. The species likely also occurs in the mainland African portion of Equatorial Guinea, which lies between occurrences in Cameroon and Gabon.

ILLUSTRATIONS.— Thiselton-Dyer (1896:t. 2427); Heine (1966:75, Pl. 15).

Although only a single collection (*Mann 1839*) of *Afromendoncia phytocrenoides* was cited in the protologue, several specimens of it exist. It is unknown whether Lindau had a specimen at B that is no longer extant, but it is clear that he saw and annotated materials at K, where three syn-

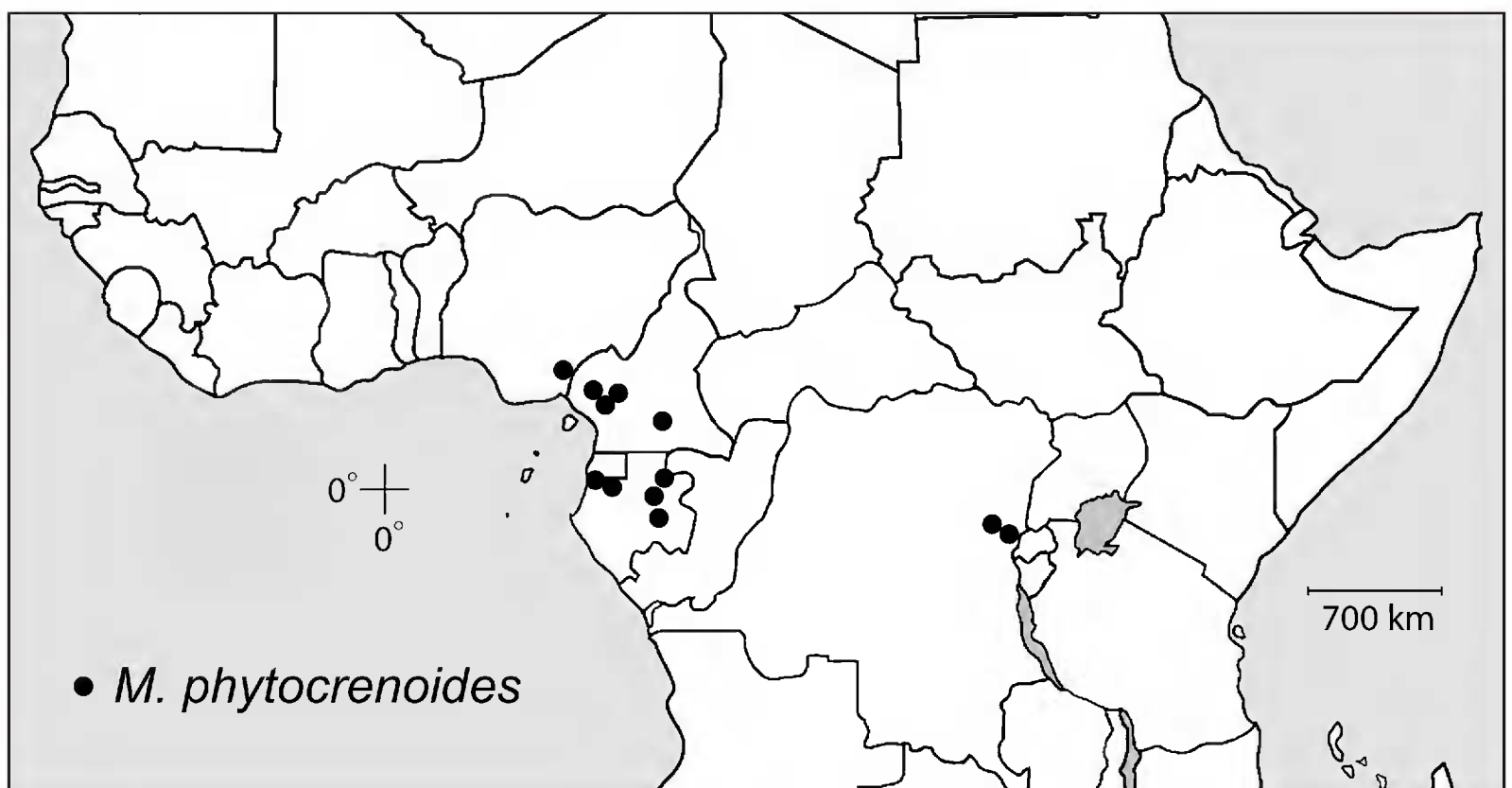


FIGURE 18. Map of central Africa showing distribution of *Mendoncia phytocrenoides*.

types are extant. One of these from Hooker's herbarium (K-00393679) was annotated as "holotype" by Breteler in 2013. Because this specimen bears the greatest amount of original label data as well as both Anderson's manuscript name and that of Gilg (both noted in the protologue), we designate this specimen as the lectotype for *A. phytocrenoides*. Similarly only a single collection of *Mendoncia letestui* was cited in the progologue, but multiple specimens of it exist, with at least two at P that bear the name in Benoist's handwriting. From these syntypes, P-00435326, with more complete locality information, is chosen as the lectotype.

We include *Mendoncia phytocrenoides* var. *iodioides* in the synonymy of *M. phytocrenoides*. The distinction between these varieties was primarily the presence or absence of a layer of dendritic to stellate trichomes on the leaves and bracteoles which underlies a layer of longer, simple, antrorse-appressed trichomes. Heine (1966) recognized var. *iodioides* and distinguished it from var. *phytocrenoides* on the basis of its pubescence consisting principally of stellate trichomes (vs. pubescence principally consisting of simple trichomes mixed with branched or substellate trichomes). This feature is not consistent, and sometimes trichomes on leaves, bracteoles, and drupes of mature specimens fall off. Also, the geographic ranges of the putative varieties overlap. With the limited availability of specimens (19) and thus limited flowering material, a comparison of the floral features of the two varieties was difficult. Until additional collections are studied, the stated differences between the putative varieties appear to be insufficient to warrant their recognition at this time.

ADDITIONAL SPECIMENS EXAMINED.—CAMEROON. **Central:** près Ndokononoro, à 15 km SW de Ndikiniméki, [ca. 04°38'13.10"N, 010°46'00.59"E], *Letouzey 10888* (P). **East:** près Djouo, rive gauche du Dja (45 km SSE de Mesaména) [ca. 03°21'25.88"N, 012°56'17.08"E], *Letouzey 4306* (K, P). **Littoral:** Ebo Forest Research Station (proposed Natl. Park), north transect, *Osborne & Beheng 118* (K). **Southwest:** Gazette-Kupe Village, *Cable S. 3884* (MO); main trail from Kupe village toward Mt. Kupe, *Etuge M. 2769* (MO); Mount Kupe, SW slope, main trail to the top from Kupe village [ca. 04°46'44.72"N, 009°40'47"E], *Schönenberger 50* (F, K, P). CONGO-KINSHASA. **North-Kivu:** Kabunga Terr., Walikale [ca. 01°24'55.03"S, 028°03'43.23"], *Leonard 1792* (BR). **South-Kivu:** Kalehe Terr., réserve IRSAC à Irangi, km 110, route Kavumu–Walikale, *Christiaensen 1796* (BR). GABON. **Estuaire:** Akoga, N des Monts de Cristal, *Hallé, 892* (P). **Ogooue-Ivindo:** 15 km SW Makokou, [ca. 00°28'23.47"N, 012°44'59.25"E], *Hallé 2654* (P); Belinga [ca. 01°07'58.16"N, 013°11'50.27"E], *Hallé, 3358* (K, P).

10. *Mendoncia vinciflora* Benoist, *Bull. Mus. Hist. Nat. (Paris)* 31:387. 1925. **TYPE.**—MADAGASCAR. **Mahajanga:** Ankaizinana [Ankaizina; 14°17'51.15"S, 048°39'56.55"E], Apr 1923, *Decary 1955* (lectotype, designated here: P-P00091112!).

Young stems glabrous to mealy-glandular or sparsely to densely pubescent with antrorsely appressed, golden-brown to yellowish, unbranched, eglandular trichomes 0.1–1.2 mm long. Leaves membranaceous to coriaceous, petioles to 40 mm long, glabrous or pubescent like young stems but with trichomes to 1.5 mm long, blades ovate to elliptic to obovate, 32–175 mm long, 19–86 mm wide, acute to rounded to subcordate at base, acute-apiculate to acuminate-caudate at apex, abaxial surface glabrous to mealy-glandular and veins (at least midvein) also pubescent with erect to flexuose, unbranched, eglandular trichomes 0.1–2 mm long, adaxial surface glabrous to sparsely or densely pubescent with eglandular trichomes to 0.5 mm long along major veins. Inflorescences borne in leaf axils on young, mostly herbaceous and leafy stems, solitary or opposite at nodes, dichasia 1–4 per axil, peduncles to 74 mm long, glabrous or pubescent like petioles. Bracteoles color unknown, deciduous by time of fruit maturity, elliptic to ovate-elliptic, 10–18.3 mm long, 5.6–13.7 mm wide, rounded at base, rounded to acute at apex, abaxial surface mealy-glandular and

pubescent with antrorse to antrorsely appressed, unbranched, eglandular trichomes 0.1–1.2 mm long, adaxial surface mealy-glandular and usually not densely pubescent at apex with dense and minute trichomes. Calyx glabrous to mealy-glandular or with a few eglandular trichomes to 0.5 mm long. Corolla pink or light to dark purple, 20–35 mm long, externally mealy-glandular, internally mealy-glandular to sparsely (to more densely in throat) pubescent with glandular trichomes 0.1–0.3 mm long, tube 9.4–15 mm long, limb 19–37 mm in diameter, upper lip 10–17 mm long with emarginate lobes 8–13 mm long and 6.6–14 mm wide, lower lip 9–21 mm long with emarginate lobes 5.7–18 mm long and 6–18 mm wide. Stamens 6.5–10 mm long, ventral pair inserted 1–2 mm distal to dorsal pair, thecae 4.2–7.5 mm long, pubescent at base with a tuft of bristles 0.1–0.2 mm long, these sometimes extending toward apex of thecae, connective extending 0.4–0.5 mm beyond thecae, extension of connective attenuate, pubescent with glandular and eglandular trichomes 0.1–0.3 mm long, staminode 0.5–0.6 mm long. Pollen 5-colpate, $E = 23\text{--}25\text{ }\mu\text{m}$, $P = 23\text{--}24\text{ }\mu\text{m}$, $P:E = 0.973\text{--}0.974$, $C = 5.8\text{ }\mu\text{m}$, $C:P = 0.245\text{--}0.257$, rugulae sometimes \pm indistinct, sparsely to densely microverrucate to microgemmate to microbaculate. Style 11–15 mm long, glabrous to sparsely mealy-glandular or sparsely pubescent with eglandular trichomes 0.2–0.4 mm long, stigma subequally to unequally 2-lobed, lobes 0.2–0.8 mm long. Drupe subspherical to spherical, 16.4–30 mm long, 14.8–25 mm in diameter, glabrous to mealy-glandular.

PHENOLOGY.— Flowering: December–April; fruiting: November–April.

DISTRIBUTION AND HABITATS.— Northern Madagascar (Antsiranana, Mahajanga; EOO = 5,756 km²; Fig. 9). Plants occur in montane, wet, evergreen forests. Elev. 1240–2100 m. *Mendoncia vinciflora* is restricted to upper elevations in the northern mountains near the border regions of Antsiranana and Mahajanga.

ILLUSTRATIONS.— Benoist (1967: Fig. 1); Fig. 19.

The lectotype of *Mendoncia vinciflora* is chosen from among the four collections cited in the protologue (Benoist 1925): *Decary 1955*, *Decary 1971*, *Perrier de la Bathie 15294*, and *Perrier de la Bathie 15324*, all of which are currently extant at P.

Sometimes two staminodes are evident in the flowers of this species. Among Paleotropical species, *Mendoncia vinciflora* has some of the largest corollas and the largest drupes, which unlike those of other species are usually spherical.

ADDITIONAL SPECIMENS EXAMINED.— MADAGASCAR. **Antsiranana:** Massif de Marinorahona SW de Manambato (haute Mahavavy du nord, District Ambilobe), [ca. 13°45'24.19"S, 048°58'52.14"E], *Humbert & Capuron 25734* (P); Camp 3, summit vegetation of Anjanaharibe-Sud, 14°44'42"S, 049°25'58"E, *Lewis et al. 1353* (MO); E of Ankaramy, Réserve Speciale Manongarivo, Antsatrotro, SE of summit, river valley between Antsatrotro and massif, 14°05'S, 048°23'E, *Malcomber et al. 1489* (MO); Massif de Zaratanana, *Perrier de la Bathie 15294* (P), *15324* (P), *15546* (P); Andapa, Doany, forêt d'altitude d'Ambohimirahavavy, 22 km E du chef lieu de la commune Mangindrano, Bealanana, Montagne de Beampoko, 14°13'41"S, 049°08'14"E, *Randrianarivelo et al. 330* (MO). **Mahajanga:** Ankaizeriana (Ankaizinana), [ca. 14°30'S, 048°55'E], *Decary 1971* (P); montagnes N de Mangindrano (haute Maevarano), jusqu'aux sommets d'Ambohimirahavavy (partage des eaux Mahavavy-Androranga: centre-nord), [ca. 14°16'S, 048°56'E], *Humbert & Capuron 25016* (K, MO, P), *Humbert & Capuron 25353* (BR, K, MO, P); Mangindrano, Bealanana, [ca. 14°32'30"S, 048°45'E], *Njila 7039* (P); Fiv. Bealanana, commune Mangindrano, Forêt Antetikalambazaha, aux environ de Rivière Befosa, dans le Massif de Tsaratanana, 9 km N de Mangindrano, 14°10'27"S, 048°56'42"E, *Razafitsalama et al. 308* (MO); Ankailatsaka, (nearest village), canton de Mangindrano, District Bealanana, RN IV, *Service Forestier Madagascar 47-RN* (P).

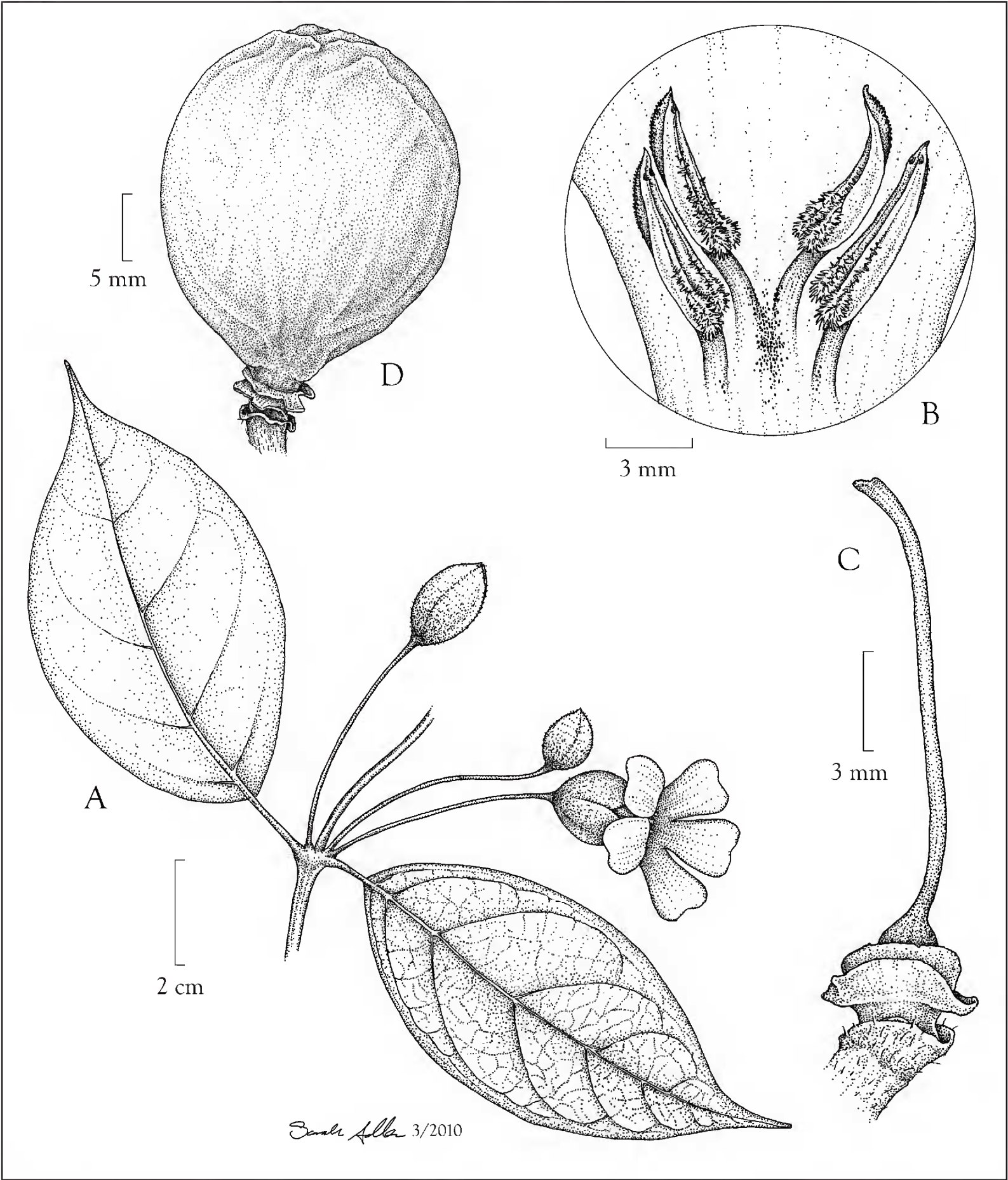


FIGURE 19. *Mendoncia vinciflora*. A. Fertile node with one dichasium bearing a flower (Humbert 25016). B. Corolla tube split open to show androecium (Humbert 25016). C. Apex of peduncle and flower following dehiscence of corolla, showing (from bottom) flared apex of peduncle, short pedicel, calyx, nectar disc, and gynoecium (Humbert 7039). D. Drupe (Randrianarivelo et al. 330). Drawn by Sarah Adler.

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APPENDIX 1.

Collections of Paleotropical *Mendoncia* used in pollen (SEM) studies

M. cowanii: Daniel et al. 11000

M. delphina: Malcomber et al. 1665

M. flagellaris: Daniel et al. 9131, 9239, 9276

M. gilgiana: Breteler 1834; Jacques-Felix 4756; Tisserant 118

M. kely: Andrianantoanina et al. 11

M. lindaviana: Hladik s.n.

M. phytocrenoides: Letouzey 4306

M. vinciflora: Humbert & Capuron 25734

APPENDIX 2.

Occurrences of Paleotropical species of *Mendoncia* by country and island

Cameroon: *M. gilgiana*, *M. lindaviana*, *M. phytocrenoides*

Central African Republic: *M. gilgiana*, *M. lindaviana*

Congo-Brazzaville: *M. gilgiana*, *M. lindaviana*

Congo-Kinshasa: *M. gilgiana*, *M. lindaviana*, *M. phytocrenoides*

Equatorial Guinea: *M. gilgiana*

Gabon: *M. combretoides*, *M. gilgiana*, *M. lindaviana*, *M. phytocrenoides*

Ghana: *M. combretoides*, *M. gilgiana*

Guinea: *M. combretoides*, *M. gilgiana*

Ivory Coast: *M. combretoides*, *M. gilgiana*

Kenya: *M. gilgiana*

Liberia: *M. combretoides*, *M. gilgiana*

Madagascar: *M. cowanii*, *M. decaryi*, *M. delphina*, *M. flagellaris*, *M. kely*, *M. vinciflora*

Mayotte: *M. flagellaris*

Nigeria: *M. phytocrenoides*

South Sudan: *M. gilgiana*

Tanzania: *M. gilgiana*

Uganda: *M. gilgiana*

APPENDIX 3

Geographically based keys to Paleotropical taxa of *Mendoncia*

Key to Species of *Mendoncia* in Continental Africa

- 1a. Young stems, petioles, peduncles, and abaxial surface of bracteoles pubescent with at least some branched (stellate to dendritic) trichomes 2
- 1b. Young stems, petioles, peduncles, and abaxial surface of bracteoles glabrous or pubescent with unbranched trichomes only 3
- 2a. Inflorescences borne in leaf axils on young, mostly herbaceous, leafy stems; corollas 17.5–22 mm long; style 16–18 mm long; drupes mealy-glandular (lacking elongate trichomes); leaves 44–133 mm long and 23–86 mm wide. *M. combretoides*
- 2b. Inflorescences mostly borne at naked nodes on older, woody, leafless stems; corollas 29.3–31.8 mm long; style 22.8–27 mm long; drupes pubescent with eglandular trichomes to 0.6 mm long; leaves 86–200 mm long and 57–114 mm wide. *M. phytocrenoides*
- 3a. Inflorescences mostly borne on peg-like, woody, sometimes branched short-shoots at naked nodes on older, woody, leafless stems; young stems, peduncles, and abaxial surface of leaves glabrous to mealy-glandular, lacking elongate trichomes; drupe oblong (symmetrical), 12.3–19.9 mm long *M. lindaviana*
- 3b. Inflorescences borne in leaf axils on young, mostly herbaceous, leafy stems; young stems, peduncles, and abaxial surface of leaves pubescent (sometimes sparsely so) with eglandular trichomes to 2.3 mm long; drupe ± irregularly shaped, overall obovoid and widest at or just below apex, 6.8–11.8 mm long *M. gilgiana*

Key to Taxa of *Mendoncia* in Madagascar and Mayotte

- 1a. Ovary and drupe glabrous or mealy-glandular (i.e., with inconspicuous, sessile glands mostly < 0.05 mm in diameter), lacking elongate, eglandular trichomes; bracteoles abaxially glabrous to sparsely pubescent (rarely densely pubescent); calyx glabrous or sparsely pubescent 2
- 1b. Ovary and drupe pubescent with elongate, eglandular trichomes; bracteoles abaxially densely pubescent; calyx usually densely pubescent 4
- 2a. Corollas pink or light to dark purple, 20–35 mm long, upper lip 10–17 mm long; bracteoles usually lacking dense pubescence at apex of adaxial surface; extension of connective beyond anther thecae pubescent with glandular and eglandular trichomes 0.1–0.3 mm long; drupe subspherical to spherical, 14.8–25 mm in diameter; northern Madagascar. *M. vinciflora*
- 2b. Corollas white and usually with purple markings near base of limb and/or throat (rarely purplish in *M. delphina*), 8–18.5 mm long, upper lip 2–12.5 mm long; bracteoles with dense pubescence at apex of adaxial surface; extension of connective beyond anther thecae (if present) glabrous to minutely glandular; drupe ovoid-ellipsoid to ellipsoid to spherical to obovoid, 6–15.7 mm in diameter; widespread 3
- 3a. Dichasia 1–2 in axils of leaves; apex of leaf blade acuminate to caudate, with tail-like apex to 12 mm long; bracteoles yellowish, lacking a pair of conspicuous, whitish, bulbous, gall-like basal protuberances; stigma subequally to unequally 2-lobed; pollen 5-aperturate; southern Madagascar *M. delphina*
- 3b. Dichasia 1–4 (–8) in axils of leaves or commonly in axils of bracts in an a raceme to 15 cm long; apex of leaf blade (acuminate) to acute to rounded to truncate to retuse, and sometimes

- with an apiculum to 1.6 mm long; bracteoles green, often with a pair of conspicuous, whitish, bulbous, gall-like basal protuberances; stigma capitate; pollen mostly 4-aperturate; widespread
..... *M. flagellaris*
- 4a. Corollas 13.2–19 mm long, tube 10–14 mm long; leaf blades mostly with length:width 1.4–1.8
..... *M. kely*
- 4b. Corollas 26–49 mm long, tube 20–38; leaf blades mostly with length:width 1.7–2.8..... 5
- 5a. Corollas white with purplish markings, limb 20.6–32.4 mm in diameter, upper lip 13.5 mm long with lobes 8–10 mm long and 11.2–13.2 mm wide, lower lip 16.5–19 mm long with lobes 9.4–13.5 mm long and 12.2–15.2 mm wide *M. decaryi*
- 5b. Corollas light pink to dark pink (sometimes whitish externally), limb 6–21 mm in diameter, upper lip 1.8–10 mm long with lobes 1.8–7.4 mm long and 3.7–8.6 mm wide, lower lip 3–12.4 mm long with lobes 2.2–7.5 mm long and 3.4–9.1 mm wide 6
- 6a. Young stems, petioles, abaxial surfaces of leaf blades and bracteoles, and peduncles subglabrous and/or pubescent with erect to flexuose to antrorse trichomes, underlying surfaces plainly visible; corolla with upper lip 4.4–10 mm long and lobes of lower lip 3.5–7.5 mm long and 3.5–9.1 mm wide *Mendoncia cowanii* var. *cowanii*
- 6b. Young stems, petioles, abaxial surfaces of leaf blades and bracteoles, and peduncles densely pubescent with flexuose-interwoven trichomes such that underlying surfaces not visible (or only partially so on abaxial surface of leaf blades); corolla with upper lip 1.8–3.6 mm long and lobes of lower lip 2.2–3.3 mm long and 3.4–3.5 mm wide. *Mendoncia cowanii* var. *coursii*